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ECHOES
IN
PLANT AND
FLOWER LIFE

BY L. H. GRINDON.







ECHOES

IN

PLANT AND FLOWER LIFE.

BY
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PREFACE.

THE following pages do not profess to consist of anything more than memoranda and observations, from a poet's point of view, respecting a certain class of botanical facts. These facts, which, unable to think of a better name, I call echoes, "Science" may some day find it worth while to detach; then, marshalling them with others of similar nature, elaborate from the whole a technical treatise. To be a *philosophical* treatise, the treatment must be æsthetic.

No collection of this class of facts has hitherto been made, so far, that is, as I am aware; nor does the idea which they illustrate appear to have suggested itself to men of science, except as something for the occupation of students yet to arise. To poetical minds (in function the precursors of "scientific" ones) the idea has of course been long familiar.

That by the "scientific" the idea is thought not unworthy of attention, may be judged from the following remarks of one of our most distinguished living botanists—Dr. Berthold Seeman :—

"About the term 'mimicry' there should be a clear understanding. It is, so far, a thoroughly objectionable one, as by employing it either in zoology or botany the whole question is prejudged; indeed it is assumed—1. That organisms have the power to mimic other organisms; and 2. That they have come in contact with those organisms which they are supposed to mimic. Employ the terms 'outer resemblance' instead of mimicry, and we are on neutral, undisputed ground. The subject of these external resemblances of species and whole genera to others having an entirely different organic structure, is a wide and complicated one; and I think that the best way to approach it is to go through the whole vegetable kingdom, and take note of every case where the outer features of one species or genus are reflected in any other. Some years ago, my late lamented friend, Dr. Schultz-Bipontinus, read a paper on his favourite order, the Compositæ, in which he pointed out that in this the largest of all Phanerogamous orders, the habit of almost every other order of the vegetable kingdom cropped up again. In Euphorbiaceæ and other large orders, similiar instances are noted. Sometimes this outer resemblance is perfectly startling. I remember finding a Sandwich Island plant, which looked for all the world like *Thomasia solanacea* of New Holland, a well-known *Buettneriacea* of our gardens, but which on closer examination turned out to be a variety of *Solanum Nelsoni*; the resemblance between these two widely separated plants being quite as striking as that pointed out in Bates' 'Travels on the Amazons,' between a certain moth and a humming bird. This outer resemblance between plants of different genera and orders has played us botanists many a trick, and is one of the many causes of the existence of some almost incomprehensible synonyms in our systematic works. Wendland, in his monograph on *Acacia*, described many good

species, and thought he knew an *Acacia* when he saw one; yet one of his new ones (*A. dolabriformis*) which he referred to the genus from habit alone, turned out to be a *Daviesia*. Few men had a better knowledge of Ferns than Kunze, yet 'mimicry,' Puck-like, played him a trick when, relying on the nature of the leaf and venation, he referred *Stangeria paradoxa*, a Cycad, to true ferns; and Sir W. J. Hooker, good botanist as he was, would never have figured a *Veronica* as a Conifer, if 'mimicry'—using the term for the last time, had not been at play. At present I have no theory to propose on this subject, but whoever has, ought to both bear in mind that it must apply with equal force to the animal and vegetable kingdoms, and that to say that these resemblances are merely accidental, counts for nothing until it shall have been proved that there are such things as 'Accidents in Nature.'—*Gardeners' Chronicle*, June 27th, 1868.

Like Dr. Seeman, I have no scientific theory to propose. Content to observe and register facts, and to weave them together in my own spontaneous way, thereby perhaps pleasing a reader here and there, I leave it to others to deal technically with the materials I lay before them.

It may be well to add that the whole of this essay was written before the appearance of Dr. Seeman's letter above quoted.

LEO H. GRINDON.

MANCHESTER, *January*, 1869.

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Echoes in Plant and Flower Life.

CHAPTER I.

THE GENERAL SUBJECT.—ILLUSTRATIONS FROM THE
ASPECTS AND PHYSIOGNOMY OF PLANTS.

1. "WHEN Day, drawn by white steeds, had overspread the earth, resplendent to behold, first of all a shout from the Greeks greeted Echo like a song; and Echo, from the island-rock, in the same moment shouted back an inspiring cry." *

That which Æschylus depicts so beautifully, in regard to echo for the ear, has its "respon-
dence," as Lord Bacon happily terms it, in the repetitions to the eye which occur with so much emphasis in the phenomena of plant and flower life. Differentiated from one another so exactly that to recognise a species once accurately defined is an effort as simple as to identify the face of a friend, plants and flowers still exhibit likenesses so deep-seated and unexpected that, wonderful as is the multiformity, more astonishing yet becomes the unity of design. On every hand we hear some curious reverberation; all things seem to delight in wearing robes which belong

* Æschylus. "Persians." 386-391.

to others. Nothing is unique ; nothing is sectarian or purely local ; the old, old natural melodies of fatherland and childhood swell for us upon the remotest shores, and in one place or another, like the memory of our first affection, live for ever.

2. Awakened to this great fact, the observation of plants and flowers acquires new and inexpressible attractiveness. They cease to be the independent things they seemed. Every one of them takes its place, to the inner sight, as the centre, in turn, round which all other things revolve ; that which was silent begins to speak ; and after we have feasted ourselves on the glorious spectacle as *savans* and physiologists, there comes the higher and more exquisite consciousness that such unity can exist only as the disclosure of a Divine Architect. It is not so much in the magnificence, the variety, the ingenuities of nature, that we find the certificate of the hand of God. The proof is in the incessant "cropping out," as the geologists say, of ideas that seem identical, and under circumstances which, so far from requiring the presence of those ideas to give completeness, often seem actually inconsistent with their manifestation. Whatever "natural selection" may originate or determine ; whatever may have been the "natural laws" under which the things we see around us first came into existence,—the occurrence of corresponding phenomena under conditions the most dissimilar, or at all events amid totally

different associations, is intelligible upon this ground only, and no other. They are like the gold and silver coins with Cæsar's image and superscription, which, though mingled with everything possible to civilization, and found under circumstances the most varied, still point to Cæsar—silently and conclusively. In science and philosophy, as in trouble and in death, willing or unwilling, we must go to God at last. Why not then accept Him at the first?

3. Resemblances in superficial aspect, unaccompanied by structural agreement, are so numerous that names founded upon them constitute a large portion of the plant-vocabulary. Such are "ground-ivy," "ground-elder," "Cape-jasmine." For although these names would lead us to expect some close affinity, the plants in question are no more related to ivy, etc., than they are to poplar-trees: the comparisons on which they are founded are those of a child. Similar to them are the names tulip-tree, marsh-marigold, sea-lavender, sea-holly; with many others which are disguised by their being derived from an unfamiliar language, as "chamomile," literally the "ground-quince," so called because of its odour, which by some is thought to agree with that of the fruit. Erroneous as they are, there is nothing in these names to object to. Popular names cannot possibly have the accuracy of scientific ones, and when consecrated by long use, and embosomed in literature, they possess all the validity of the

exactest. We can no more afford to surrender "mountain-ash" than to resign Orion and the Pleiades "shedding sweet influence."

4. Scientific names themselves are, to a very considerable extent, of the same character. Take, for instance, the multitude of specific names ending in *-aceus*, *-inus*, and *-oides*, which affixes are intended to express likeness without absolute affinity. *Arenaria peploides* is literally the spurge-like sandwort; *Bromus secalinus*, the brome-grass which resembles rye; *Protea cynaroides*, the *Protea* which bears similitude to an artichoke. There are multitudes of plants also, which, bearing some degree of resemblance to others in a particular member, have names ending in *folius* and *phyllus*, when the likeness exists in the leaves; in *florus* and *anthus* when it is found in the flowers; and in the names of the other respective organs, when it is found in the root or in the stem, in the fruit or in the seed.

5. Resemblances of a little higher kind gave rise, ages ago, to that beautiful and classic set of *quasi-generic* names, chief amid which are rose, lily, and violet. In ancient times a flower needed but seem a lily to be called one; the same with such as suggested the thought of a rose or violet; all which names, thus bestowed upon companies of what was lovely, presently became more comprehensive yet, and signified flowers in general. "Consider the lilies of the field," is not an invitation to look

simply at a little crocus-like Syrian blossom named by Linnæus *Amaryllis lutea*. We are enjoined thereby to contemplate the fair simplicities, and the incomparable perfections of nature in the whole sphere of her living brightness, and to gather from them the sweet wisdom that lies waiting. So when Pindar wants to tell us, by the beautiful metaphor of returning spring, that fortune has come back to some whom she had cast awhile into the snows. "Now," he exclaims, "this happy household, like the earth, blossoms with purple roses."* There is no such thing as a "water-lily;" there is no such thing as a "christmas-rose;" albeit roses may be had by handfuls in mid-winter: these pretty appellations are only conventional, just as a deep-blue autumn gentian is by usage the "Calathian-violet." Compare with these names, "alpine-rose," which has been given to a rhododendron; "rock-rose," which appertains to a kind of cistus; the rose-of-Sharon, and the rose-of-Jericho; lily-of-the-Nile, trumpet-lily, and dames' violet.† Compare, too, the corresponding extension of the name of "apple" by the ancients, to almost every spherical fruit that superficially seemed pomiform, as to the orange and to the pomegranate, the citron, and the quince; and by the

* Isth. III., 24-36.

† Properly the "Damascus violet," or Damascus flower, just as the Damascus plum is called the "damascene," and the Damascus rose the "damask."

moderns to the fruits called thorn-apple, pine-apple, and custard-apple. Only through the almost convertible sense of the names apple and pomegranate, can we enter into the heart of the metaphorical uses of them in oriental poetry, and in that of ancient Greece; it is in the same that we have the key-note to the famous fable that Eve's "forbidden fruit" was an apple. Scripture never says so, though, in a certain sense, it is true nevertheless; and although the name apple does certainly appear in scripture, it is by mis-translation of a word which should have been rendered "citron."

6. The resemblances which consist in veritable structure are made use of by the systematic botanist to establish classes; genera likewise, alliances, orders, and the other groups and sections, large and small, into which plants are technically resolvable. To assist in the great work of classification is one of the earliest and most assiduous cares of the student of plants. Comparing the roots, the stems, the foliage, the flowers, the fruits, the veining of the leaves, the anatomy of the wood, the sculpture of the seed-surface, and other organs and lineaments, some brought to view only by the Ithuriel of the microscope, he is enabled so to marshal plants as to have all before him at a glance, like the pictures of states and kingdoms in an atlas. These are resemblances of the most intimate nature. They are often independent of external similarity, and even

at variance with it, as witness the asparagus-plant and the lily-of-the-valley. No two plants can be more unlike in aspect, yet in their flowers, one by comparison large, the other small, and in their round red berries, they are almost a match. The determination of such resemblances is one of the pleasures that lengthens life. Waiting and watching for the flowers of a plant; then waiting and watching for its fruit; comparing and weighing the evidence for and against; searching for and discovering rare collateral testimony; the hopes, the misgivings, the delight when the accomplished truth shines clear in a new aurora,—these are things which, in the right order of their use, widening out the office at once of the senses and the imagination, become nutriment for both, thus donors of the true *elixir vitæ*, which term, being translated, signifies “ideas.” Life consists not in birthdays, but in the enjoyment of our intelligence; and this has no more salutary exercise than in the study of plants.

7. Not even these, however, are the resemblances which we intend by nature’s flower-echoes. For an echo is that which comes back, like the reflections in still water, from a thing wholly distinct from the one that called to it. One bee does not echo the drowsy murmur of another; nor does wave reply to wave when the sea-choristers lift up their music on the shore, though each sweet sound is reduplicated to the listening ear. Each has its

resonance from things of another substance, and it is after this manner that we have the echoes of plants and flowers. The tree in the ancient forest calls to the blossom upon the hills; the fern in the dell calls to the weed upon the beach.

8. That one kind of grass shall, in a measure, be like another kind; that the lupine-flower shall resemble that of the bean; and that the alder shall have catkins like those of a birch, is thus *not* in echo. For these are plants which run abreast in every main particular, being members of definite families. So, again, there is no echo amid the lilies mistakenly so termed, since they resemble each other not in fact, but illusively. Echo not only comes from a distance, but returns note for note, and herein lies the sweetness of the miracle.

9. Let us begin somewhat in the order in which botanists consider the parts of plants, *i.e.* by looking first at their customary members, which never exceed five in number,—the root, the stem, the leaves, the flowers, the fruit. For however diversified plants may be in stature and physiognomy, when analyzed and taken to pieces, these are all the truly different parts which even the most complex are found to possess. Nature's methods are all kaleidoscopic; the results are diversified infinitely, but whatever portion we scrutinize, the materials of which they are wrought may be counted by units. It is true that there often *seem* to be more than the

five parts mentioned ; the pea, for instance, possesses tendrils. Look accurately, and you will find that these delicate green fingers are adaptations of certain leaflets to the requirements of the plant's incapacity for standing erect,—that they are in fact, the midribs of the four or five uppermost leaflets of the set of nine or eleven which constitutes the entire leaf, restrained to the filamentous form, and endued with the power of twining. So with the prickles of the bramble, which are hairs grown thick and ligneous ; so with the honeycups of the aconite, which are petals transformed. To *this* list of changes there is no end ; every botanist is his own Ovid ; the best part of the metamorphoses has yet to be sung.

10. So far from the number five being exceeded, in many plants even all five parts are not developed ! The mistletoe, a parasite, has no root ; hyacinths possess the merest rudiment of a stem ; the opuntia is leafless as an icicle. Ferns, mosses, seaweeds, fungi, give scarcely a hint of the *beau-ideal* of a flower, and usually fail to do even that little. Hence we have that great section of the vegetable kingdom which may be compared to the Invertebrata among animals ; and which, because of the rudimentary condition of the parts in question, is popularly called the Flowerless. Linnaeus did better in denominating these plants the Cryptogamia or the “hidden-flowered,” since the *essentials* of

the flower, the stamens and pistils, though not the petals, exist in them rudimentarily.

11. Taking the several organs separately, their own constituent parts are equally few, and a similar reduction is not only possible, but often witnessed. Here, too, the differences come entirely of new adjustment. As the elements of the human countenance are the same all over the world, varying in countries and individuals simply in colour and proportion;—as beautiful eyes differ from dull ones not in composition but in hue and language; so do plants and their members differ, not in possessing additional parts, but in the playing forth of new energies and new tones of utterance by the old.

12. As an instance of echo in general plan and figure, take the passion-flowers and the Cucurbitaceæ, the latter comprising all plants of the gourd and melon kind. They differ widely in their blossoms, those of passion-flowers possessing, ordinarily, a showy coronet, so that every corolla seems a star-fish, with an actinia in the midst; the cucurbits on the other hand, are, as a rule, vases of gold, unadorned except with tracery of their own colour. The passion-flowers, moreover, have their stamens and pistil elevated on a pillar, often as tall as the petals are long, so that the centre of the glorious flower-star seems lighted with a candelabrum; while in the cucurbits the ovary is *beneath* the blossom, and the stamens are

lodged in a separate chamber. These last-named differences are considered so important that the two families are, by at least one of the masters in botanical science, placed far asunder. And it seems right so to deal with them; for no considerations outweigh those which are founded on normal phenomena pertaining to Sex,—in the cucurbits illustrated admirably. Turning, however, to the stems, the foliage, the tendrils, and the habits of life while in a state of aboriginal freedom, the differences in the flowers no longer detain us, and the two races almost exactly correspond. If one lives among the trees, so does the other, for gourds and melons trailing upon the ground in a field or garden, are in a condition totally foreign to their natural destiny; if one race produces fruits that seem gourds in miniature, the other ripens titanesque passion-flower berries; if one throws out great curling clasps, like wire bell-springs, and which often, midway, reverse the direction of the coil,—so does the other, replying in every particular.

13. It is curious, while contemplating these last-named organs, the tendrils, to note in how many widely different plants either similar or analogous climbing-instruments are developed. The pea has already been alluded to. The grape-vine, the Cissus, and all of their family, produce them, like the passion-flowers and the cucurbits, from the axils of the leaves. In that matchless East Indian

mixture of lily and honeysuckle, the *Gloriosa*, they consist of the attenuated and twisted extremities of the leaves; and exactly the same thing occurs in the South American *Mutisias*,—plants belonging to the great family of which the aster is the type. In both families the existence of tendrils is a phenomenon of the utmost unexpectedness. There are plants again which, ungifted with the power of producing tendrils, yet living in urgent need of such appliances, construct ingenious substitutes by curling and twisting their leaf-stalks. Such are the *Tropæolums* and the *Clematis Vitalba*; also the scrambling species of fumitory, which in adroitness and skill are excelled by none. The Virginian-creeper constructs another kind of tendril-substitute. Instead of curling and twisting any portion of its stalks or leaves, it puts forth sprays of tentacula, every long fibre provided at the extremity with a viscid knob, by means of which the plant cements itself so firmly to its support that no storm can wrench it away, and the tentacula break before the knobs can be disengaged. Lastly, in a climber called *Desmoncus*, and in the *Combretum grandiflorum*, plants not in the least degree related or otherwise comparable, the leaf-stalks, as soon as the blade withers, curve, and harden into hooks!

14. As another instance of echo in general figure and contour, take that of the *Nymphæas* and other so-called water-lilies, by the *Villarsias*. These little

simulators belong to the gentian-family, a group not possessing the slightest botanical affinity with the other, and except in the Villarsias and the Menyanthes, wholly terrestrial. The gentians, moreover, so far from being aquatic, are noted for their love of lofty and alpine habitats; equally so for their erect attitude and their bitterness. How comes it that one of such a company should be found in the river? Is there an Undine, too, among the wild-flowers? Made into a mummy and gummed on paper as a "specimen," how reluctantly she acknowledges her kindred! Better to hear her cry in the calm summer evenings, "Am not I, too, a water-lily? Look! my round and mottled leaves float as do those of all of ye; I spread myself out as ye do, and roof the fishy depths." The voice is heard, but the re-echo comes not from the proud Nymphæa: now it is pronounced by another darling of the stream, with milk-white petals—the peasants call it "frogbit," the learned, *Hydrocharis*.

15. Aloes and Bromelias, the pride of the New World, in parts where the sun shines hottest, have an echo in that singular aquatic of the Old, the Stratiotes, or "water-soldier." Other aquatics assume the forms of certain terrestrial Ranunculaceæ. This last is an echo the more remarkable from the circumstance of the plants in question, called Alismas, being of the class called Endogens, while

the others are of the class termed exogenous. It is as strange a thing to witness in the plant-world as it would be for a quadruped to assume a clothing of feathers. The very unusual circumstance of there being a less number of stamens in a flower than of pistils (which happens in the Alismas), also has its parallel in the Ranunculaceæ,—in the *Myosurus*, to wit, and in the ivy-leaved snow-cups, which, like a timid boy on the river's bank, undressed and ready for the plunge, seems aye to hover at the edge, and never to bathe.

16. These self-same Ranunculaceæ repeat, in other instances, certain members of the rose-family. *Potentillas* are buttercups wrought more delicately; the burnished metal of the one becomes in the other tender and wrinkled; in each the fruit constitutes one of those little granaries to which botanists have given the classic name of "etærio." Here and there occur agreements still more striking, as between the hairy tails attached to the seeds of certain anemones, and those which belong to the *Dryas* and to the *Sieversia*.

17. The tropics and the hotter temperate portions of both hemispheres are ennobled by the presence of Palm-trees,—those princely plants which lift up tall, straight, branchless trunks, as spires rise in a city, and sustain upon the summit a crown of prodigious leaves. How prettily this grand form is echoed by some of the smallest and weakest things of nature

let the sensitive *Oxalis* and the palm-cyperus declare. Attaining the height of only a few inches, the *Oxalis* bears on the top of its little pillar a coronet of pinnate leaves exactly of the form found in many palms; and as if not content to echo in this respect alone, it replies also to the mimosa, making obeisance, as that plant does, to the finger, and, when evening approaches, closing every leaflet, and remaining shut till the return of day. The palm-cyperus (*C. alternifolius* of the catalogues) is a native of the Island of Madagascar. In affinities it is near the sedges, and in foliage it is not unlike them; but the flowering-stem, with its crown of bracts, is so truly a palm in figure, that if we would construct a mimic Indian scene in the conservatory, these cyperus stalks would serve perfectly for the trees. The palm-echo is by no means confined to these two plants. It comes gloriously from the tree-ferns of Australia, New Zealand, and the South Sea Islands; it is found also in the papaw-tree, *Carica Papaya*, in the *Spathelia simplex* of Jamaica, a member of the Xanthoxylaceæ; also in the *Talisia acladodea*, a member of the Sapindaceæ, inhabiting groves in Peru; and in those grand plants, the *Clavijas* of the same country. Contemplating this majestic and graceful type, we are placed over again amid those lovely lakes in the southwest of Ireland, where notes sounded on horn or trumpet, come back in reverberations so taken up by one echo after

another, that an entire bar of music may often be caught trembling in the air,—the earliest notes curving back upon the latest, until at last voiceful Killarney becomes an image of the world.

18. What Palms are to the tropics, the Conifers, or trees of the pine and fir kind, are to the temperate zones. No plants surpass the conifers in grandeur; few, if any, rival them in longevity; few, even among the palms, attain an altitude even approximate to that of the mighty *Wellingtonia gigantea*,—the mammoth-tree of California. But to many men their imposing beauty is scarcely known except by hearsay, or if individual trees have been seen, the immensity and sublimity of a pine-forest—qualities for which conifers massed together are quite as remarkable—at least are strange. Never mind. If all cannot see pines and pine-forests, neither can all behold the infinite, sweet green sea of the prairie, or look upon the innumerable green plumes of the lady-fern. Nature is full of compensations; the glory of God is to show us how the large can be represented in the little,—the forces that rule the spheres, in the teardrop upon the cheek; and for those who dwell where there are no pine-forests, there is an echo in the Equiseta, every individual standing as the very counterpart of a spruce or hemlock, and the little forest so green, so dense, and exclusive, that the whole story is told at a glance. This is particularly the case with the

species called "sylvaticum;" it is expressed also, but somewhat differently, in the *Telmatea*. They were plants of the *Equisetum* kind, which though now known only as the fossils called calamites, constituted a large portion of one of those ancient dynasties which preceded the era of man. Conifers also date in type from the infinite past; so that these two races have been, as it were, original and copy since the beginning. Compare again the head of spore-cases that tops an *Equisetum* stem, with the tessellated cone of pine or fir; and those strange trees of Australia, the *Casuarinas*, in which reappear the leafless branches of the *Equisetum*, and their singular jointings. The outline, attenuate branches, and needle-like foliage of the conifer are given over again in a full-grown plant of asparagus.

19. Euphorbias, after the same manner, in certain of their species, echo from the sultry plains of Africa those identical grotesque designs which nature has amused herself in contriving for the cactuses of Central America. Odd lumps of prickly green, round slabs, pillars, tails, and teated mounds,—these are the shapes and sculpture of the cactuses; and in all do the Euphorbias follow suit. The circumstance acquires a new singularity from the fact of the Euphorbias of Europe and of N.-America presenting themselves under ordinary and accustomed plant-forms, so as to mix unnoticed with the general vegetation. The Euphorbia idea is contained in the

flowers, and these being alike, the difference in configuration subsides into one of very slight moment. It is amusing to observe that while the contours of the Cactaceæ are thus repeated, one of their own race is at the same moment engaged in echoing the mistletoe of western Europe and Scandinavia. This is done by the *Rhipsalis Salicornoides* of the East Indies,—a plant composed of innumerable pipe-like shoots, and decked with translucent and pearly berries the size of peas.

20. One or two more illustrations, and we pass on to a different set. Heaths, which form one of the characteristic vegetable features of the extreme southern point of Africa, are echoed in habit and foliage, though not in gaiety of blossom, by the *Empetrum* of northern Europe,—one of the plants on which the grouse depend for food. The strawberry, that despatches creepers on every side, and establishes outposts at the extremities of every one of its slender runners, is echoed by that beautiful round-leaved saxifrage, called from its behaviour, the *sarmentosa*; and again the idea comes up in the silver-feathered *Potentilla Anserina*. Suspended in a basket, the saxifrage sends out a crowd of little offsets that dangle from the depending strings as if they were floating in the air;—wild strawberries, cast by accident on steep and rocky surfaces, where they cannot fix their runners as upon the earth, similarly become surrounded by a swinging crowd

of juvenile plants. Straggling hither and thither, at the ends of their slender strings, they seem as if they were striving to escape, as prisoners let themselves down from windows and parapets by ropes. Note again, how the purple *Lythrum* of the pondsides takes up the symmetrical idea of the Labiates in its square stem, opposite leaves, and spikes of many whorls of flowers; and how that beautiful white and yellow immortelle of Australia, the *Ammobium alatum*, repeats the stem and habit of the *Acacia alata*. Then we have the curious echoes on the part of plants with *twining* stems, which are scattered up and down among the botanical families, without the slightest reference to general structure. Compare, for instance, the convolvulus and the scarlet bean, the woodbine and the hop, with all those others so admirably treated of by Mr. Darwin. Pursuing our researches into the realms of the Cryptogamia, mosses are found prefiguring forest-trees, as elegantly expressed in some of their names, *Hypnum dendroides* to wit; while among the marine Algæ, or seaweeds, these likenesses may be reckoned by scores. Hence the long but picturesque names *Callithamnion thuioides*, *Rytidophlœa pinastroides*, *Dasya Arbuscula*, or "the little tree:" also *Sphacelaria filicina*, *Bryopsis hypnoides*, and two, at least, which express likeness even to palm-trees,—*Phyllophora palmettoides* and *Rhodomenia palmetta*. Every collector of these exquisite denizens of the

country of the mermaids knows how like oak-leaves are the fronds of the *Delesseria sinuata*; and how exactly the branches of the common coralline of the tide-pools, *Corallina officinalis*, give us in miniature that beautiful cactus, the *Epiphyllum truncatum*.

CHAPTER II.

THE LEAVES.

21. Look now at the Leaves of plants, their exquisite shades of green, their endless change of attitude, their diversity of outline and configuration. Botanists have discriminated many scores of different types, and of every one of these there are innumerable modifications. First, we have Simple leaves, or such as consist of a single blade, usually attached to a stalk, but not uncommonly destitute of one, and then called "sessile;" secondly, we have Compound leaves, which, like those of the lupine and the acacia, consist of many distinct pieces, articulated to a rachis common to all, and constituting a kind of republic. These last are very seldom unprovided with a stalk, whereas simple ones are quite as frequently sessile as petiolate, so that plants with compound leaves are, as a rule, much more airy-looking than those which have simple ones. Echoes occur among both kinds, some forms being so rare as to possess scarcely a single analogue in their own country, while at the same time they are reverberated far away. Ordinarily, for example, a simple leaf is so constructed that the stalk and the blade lie both in the same plane, or there is only a slight angle or delicate curve at the point of junction, as we may

observe in the apple, the vine, and a thousand others. There are plants, however, the leaves of which are circular or nearly so, sometimes quite flat, sometimes with a dimple in the centre, and with the stalk attached not to the edge of the blade, but beneath, in the centre, exactly under the dimple, after the manner of the pillar of a lady's work-table. There would be nothing specially remarkable in this, were the illustrations all supplied by a single family. But they disclose themselves in the most widely different races, and echo from the most distant parts of the world.

22. Foremost among these "peltate" leaves, as they have been happily termed, stand those of the illustrious lotus of the Egyptians, *Nelumbium speciosum*,—that mystic plant which appears in the mosaics, and upon the coins and monuments of the ancient kingdom of the Pharaohs; and which, blended with ears of corn, forms a portion of the insignia of Isis, goddess of fertility, and of all that is most lovely and loveable in nature. It forms a striking proof of the little change that accompanies the lapse of time, when we compare Nature with Art, and with the vicissitudes of empires; for on those venerable monuments the plant is depicted under identically the same figure it holds at this moment, and which, after being once seen, may be recognised by a child:

"States fall; Arts fade; but Nature doth not die!"

In this gloriously-classic plant the leaves form flat green plates a foot across, while the stalks ascend to the height of a man. In our hot-houses and conservatories they rise out of the water in crowds of forty or fifty, and amid their stateliness are found flowers that seem rose and lily combined, miracles of living alabaster, scented like anise, and elevated on stalks nearly as tall as those of the foliage. When the flowers have withered, they are succeeded by seed-capsules the size and shape of half an orange that has been divided horizontally, the upper surface quite flat, and dotted with cavities, in every one of which lies a seed, almond-like in form and flavour, and famous as the "sacred bean" of Pythagoras.

23. Next in dimensions come the leaves of the caper-nasturtium. This plant, the *Tropæolum majus* of botanists, is a native of Peru, but has now become familiar in many parts of the world, partly as an ornamental garden annual, partly because esteemed as a salad, the flavour being thought to resemble that of water-cress, whence the appellation of nasturtium, which in Latin is the name of the last-mentioned plant; while "*Tropæolum*" refers to the trophy-like appearance of the great round shields, presented full front, like those of an ancient phalanx waiting the onslaught of the enemy. Amidst them we catch glimpses of the blood-stained flowers, which in colour vary from orange to the deepest sanguine.

24. Thirdly, in different countries of northern and

western Europe there are dainty little plants in which the lotus is again echoed, but so innocently and tenderly that we are at a loss which most to commend,—the great one or the diminutive. Perhaps, as in most other things, we shall find that the great commands our reverence and admiration, but that the little one wins and retains our love. And truly, just as it is better to be loved than to be formally honoured, and nothing besides, these unpretending little peltates somehow refresh our hearts, if we use them aright, more even than the spectacle of the old monarch of the Nile.

The captive in the conservatory is good for holidays and festivals, but for our daily sustenance we want the simple and familiar, the things which enjoy their liberty, and grow where it has pleased God to place them; for they allure us into the sweet side-chapels of nature's great cathedral, wherein we find ourselves face to face with the dearest amenities that have been unfolded for our enjoyment, and where we suck health both for body and soul. They take us away from the streets, and in exchange for smoke and turmoil, give us fresh air and the song of birds.

25. In England, the little plants referred to grow abundantly. One of them, called, from the shape of the leaves, the "fairies' tables," and by botanists, *Hydrocotyle vulgaris*, makes its appearance among the grass in quiet pastures, upon moors, and in remnants of weedy wilderness that the plough has

left untouched. Every leaf is round as a coin, dark and shining green, and with the horizontal preserved so exactly, that a spherule of dew might be laid in the centre and not roll off. The other we have in view is the *Cotyledon Umbilicus*, commonly called "penny-leaves" and "navel-wort;" an old-fashioned name which it would be well to alter to dimple-wort. Springing out of chinks in old limestone walls, or lodged upon the surface of a rock, where there is scarcely a handful of earth, the wonder is how it finds sufficient sustenance: often, also, it sprouts from the fissures in the brown armour of old trees, a beautiful echo not only of the lotus, in its leaf; but in its place of abode, of the epiphytes of the tropics. This perching of one plant upon another is one of the most engaging phenomena in nature. Sometimes the plant so perching itself is a parasite; one, that is to say, which seats itself upon the stem or branches of another, in order that it may subsist by theft. Parasites occur in families of very different organization, one here, another there, and sometimes a whole race is of this predatory character. Very different are the epiphytes. Here we have plants which seem to share with woman her tender and yearning impulse to seek protection in the love of the strong: rather, perhaps, do they *prefigure* that sweet impulse, since all that pertains in its fulness to the affections of the human heart, has a dulcet prelude and forerunner in the realm of leaf and blossom.

26. In the forests of the tropics, epiphytes constitute a considerable portion of the tangle. Ferns, gorgeous plants of the Bromelia kind, singular forms of the araceous type, brilliant orchids, and many others, according as the flora of the country is rich in one class of plants or another, mingle in inexpressible profusion; and not more wonderful is it to behold them mantling and well-nigh covering the massive trunks up which they climb and on which they repose, than to find every prostrate tree, although internally given over to decay, still occupied by its many-tinted household. Adorning the vigorous tree with flowery trails, girdles, necklaces, and sparkling coronals, such as of its own nature it could never develop; consoling the decrepit with new bursts of bud and verdure; shrouding even the fallen and crumbling one in a tomb of blossom, epiphytes are nature's lyric and elegiac poetry. Life receives from them an added sweetness; and over death they cast a lovely and reconciling vesture that makes the end almost more lustrous than the beginning. What this magnificent growth of fern, and orchid, and arad is to the tropical forest, the decoration given by lichen, and moss, and penny-leaf is to the trees of temperate countries. How beautiful the rugged surface of an aged trunk when laced with the emerald and furry sprays of some creeping moss! How pretty that quaint grey arborescence of the lichens, seeming an im-

mortal hoar-frost, and sometimes pendulous to the length of a yard! None of the epiphytic plants steal nutriment after the manner of the parasites. Like the birds, they are simple lodgers. The penny-leaves show a decided preference for oak-trees. These they frequently deck with hundreds of their smooth green patines, tall spikes of little yellowish flowers rising between, and reminding us of Chinese pagodas with their bells. Above them is often seen that famous old fern the *Polypodium vulgare*, its under-surface gemmed with golden spangles.

27. A remarkable instance of similarity of outline in the leaves of plants otherwise quite unlike, and possessed of no botanical affinity, is found in those of the figure called "oblique." The leaves so termed possess a midrib, but the expanded portion is twice or thrice larger upon one side than upon the other. A tendency toward this condition is observable in the leaves of many trees, such as the lime, the elm, and the beech; it is, however, in certain herbaceous and semi-frutescent plants that we find it most conspicuous. Take, for instance, those constituting the genus *Begonia*. The species comprised in this are moisture-loving plants, natives of the East and West Indies, the warm parts of South America, and of the island of Madagascar, and are remarkable in almost every instance not only for the singularity of their foliage, but for the delicacy and loveliness of their flowers. The

latter are produced usually in large, loose, pendulous clusters, which have their subdivisions thrown so far asunder, by angular divergence, as to let every blossom hang untouched by its neighbour. Like the flowers of certain other families, the blossoms are of separate sexes, and so tastefully are the two kinds intermingled, as to produce a contrast like that of men and women engaged in social converse. Both the male flowers and the female ones are flat before expansion, resembling little circular shells, slightly convex on both surfaces; and usually pink or white,—the only change being occasionally to crimson or yellow. The leaves, as we have said, are, with a few exceptions, oblique, and, in the larger kinds, possessed of the general form of the sea-shells called *Haliotis*; from which circumstance those that show the character well are popularly termed “elephants’ ears.” The resemblance to the *Haliotis* suggests another fine department of inquiry, namely, that of the echoes between the forms of plants and their constituent parts, and the shapes of animals and their different members. This we may probably consider by-and-by; for the present it is expedient to restrict attention to the plant-echoes, and having spoken of the *Begonias*, to refer to the singular resemblance found in the genus *Epimedium*, the congeners of which are the berberies. These last are prickly shrubs of the temperate parts of Asia, and of other cool countries in

both hemispheres. The *Epimediums* agree with them in certain particulars of the flower-structure, not necessary here to be specified ; and on the other hand, they exactly match the *Begonias* in the shape of their leaflets.

28. The holly-like leaf is another which makes its appearance under very various circumstances. The common evergreen shrub of the scarlet bracelets, which in the woods of north-western Europe forms so vivid an ornament of the winter, is, in its foliage, exactly repeated in the *Desfontainea* of Chili, an occurrence the more noteworthy from the fact of the *Desfontainea* being a member of the gentian family, in which, with this exception, shrubs are unknown ; and in which, again with this exception, the leaves are remarkable for their well-trimmed margins, the edges being as smooth as if clipped with scissors. Strangely fantastic in many ways are the gentians. While the rule is that they shall produce capsular fruit, a *Chironia* of the Cape of Good Hope encloses its seeds in a berry ; and the *Menyanthes* of Europe, instead of conforming to the leaf-plan of every other herbaceous species,—which is simple and undivided, and more or less ovate or lanceolate—elects to assume that of the trefoil. Like the echoes of plant and animal structure, the solitary and exceptional occurrence of particulars such as those mentioned, would furnish ample material for a long chapter, and may, perhaps, be dwelt upon in

due time. Compare also with the foliage of the holly, that of the *Cœlebogyne* of Australia, and the leaves of those curious oaks and olives which have prickly margins. What is the use of these prickly margins? The occurrence of prickles only here and there among plants, shows them to be unconnected with any general and ruling requirement of vegetation. We can only fall back upon the principle laid down at the outset, that they are illustrations of the unity of design in nature, leading us away from the earth to Him who is "the end of problems and the font of certainties."

29. In its way, the resemblance between the leaves of the common black poplar of Europe, and those of the Chinese tallow-tree, *Stillingia sebifera*, is quite as striking; and to this may be added the resemblance between the leaves of the Japanese tree called the *Salisburia*, and the leaflets of the maidenhair-fern of the West Indies. Between the two last-named there is a yet more intimate point of likeness: they agree in the distribution of the veins, which, as in many ferns besides the maidenhair, but in no other tree or plant, are disposed after the manner of the prongs of a fork, every prong producing another fork at the extremity, but no vein ever touching or interlacing with its neighbour, or even tending towards the apex, all keeping as far away from it as they can. How strange, again, the resemblance between the leaves of the batwing passion-flower, *Passiflora*

vespertilionis, and those of the *Lourea vespertilionis*, a member of the pea-family, the leaves of these two totally unconnected plants being absolutely alike : how strange, yet once more, the echo between the grand leaves of the *Aralia pulchra* of New Zealand, and the unpretending, but equally beautiful leaves of our garden lupines !

30. It is in consequence of these strange and striking resemblances between the leaves of different plants, not otherwise associated, that we have so many such names as angelica-tree. This tree is a native of Japan, and is related, through its flowers, to the ivy and to the *Aralia* just now spoken of. In foliage, however, it seems, upon a great scale, that identical plant of the European marshes from which it has been named. Conversely, we have "ground-elder," and "ground-pine," referred to at the outset, and *chamædrys* or the "ground-oak." The little leaves of certain potentillas resemble those of the horse-chesnut ; a field of liquorice-plants resembles a plantation of young ash-trees ; the *Marsilea* would be thought an *Oxalis* with four leaflets.

31. Similar in extent of diffusion, and in variety of race affording it, is the phenomenon of leaves appearing, when held between the eye and the light, as if pierced by a thousand needle-points. Botanists call such leaves "dotted." This phenomenon again would not be so remarkable were the examples all supplied by a single family. Some families do in

fact possess in dotted leaves one of their most salient characteristics. The myrtle-family is one of these; so is that noble family which includes the orange and the lemon. Nor would it be so noticeable were all the illustrations tropical; or contrariwise, were the plants affording them all denizens of cold or temperate countries, establishing or pointing to some recondite connection between climate and dots. But like the peltate leaf and the oblique, the dotted one belongs equally to torrid climes and to such as greet the spring with primroses; for in the north there is a gay and lavish genus called *Hypericum*, popularly St. John's wort, in which dots are as plainly seen as in the myrtles. One kind is actually termed the "perforatum," as if the translucent specks were genuine apertures. They are never actual holes; but in every case minute receptacles of oil, imbedded where the light comes through, and constituting, as it were, so many infinitesimal windows. Leaves containing translucent dots are, in most cases, aromatic, as admirably illustrated in the patrician myrtles, some kinds of which noble race have their leaves so thickly strewn with the little oil-specks that there seems scarcely room for veins and tissue. This may be observed in many species of Australian *Eucalyptus*. They are very densely packed also in the leaves of the orange and lemon, though even there perhaps less densely than in a plant of totally different affinities, called *Myoporum*.

In the St. John's worts the leaves lack the sweet odour found in the myrtles; so large, however, is the quantity of resinous secretion in the immature capsule of some of the species, such as *Androsceum* and *calycinum*, that if cut transversely we seem to have an unstoppered bottle of turpentine. Plants of other totally distinct families, and widely separated as to geographical position, nevertheless agreeing in the matter of dotted leaves, are on the one hand, the Mexican *Amicia* and the West Indian *Hymenæa*, each of which is an associate of the pea-flowers; and on the other, the East Indian shrubs called *Ardisia*, in which genus oil-glands occur not only upon the leaves, but upon nearly every portion of the flower and incipient fruit. Such is the case also with the powerfully scented plants which constitute the rue-family, especially the *Diosmas* and the *Euosmas* of the Cape of Good Hope. One of this race, the *Dictamnus Fraxinella*, has the odorous matter chiefly concentrated in little receptacles dispersed among the flowers; and so profusely is it exhaled while the blossom is in the pride of its maturity, that the Spice Islands themselves could scarcely supply a rival. But no perfume is more evanescent; if a stem be gathered, in an hour or so the flowers are scentless.*

* Compare also the leaves of many of the Brazilian and Mexican *Polygalas*: as *stellera*, *aspalatha*, *longicaulis*, *bicolor*, *distans*, *variabilis*, etc., which are as full of pellucid

32. Oil-glands not imbedded in the leaves, but scattered over the surface, and anchored by a little stalk, establish a corresponding link of resemblance between plants as unlike one another as mint and hops, and that aromatic myrica which from its odour and habitat has received the name of "bog-myrtle." These, when magnified, present a beautiful appearance. It is possible, not infrequently, to discern them with the unassisted eye; the microscope causes perfect disclosure, and then we have the most brilliant and varied jewels produced by living nature. In that delicate and fleecy darling of its race, the *Origanum Dictamnus*, the plant with which the wound of Æneas was healed by Venus, the beads resemble rubies; upon the calyx of the culinary sage they seem spherical drops of liquid gold. The same is the hue and aspect of the spheres upon the leaves of the myrica, and upon young leaves of the common hop, while in various species of the Labiatae they are emerald green. To see them in perfection, the leaves and other parts should be viewed with the double-tubed or "binocular" microscope. This gives a stereoscopic character to the spectacle, and the spherules seem laid on carpets of green and purple. The beads retain their colour and brightness for many years; herbarium specimens, at least dots as those of myrtles. Also the curious tropical trees and shrubs constituting the Amyridaceae and the Samydaceae, which last have linear as well as circular dots.

a quarter of a century old, present almost as rich an appearance as freshly gathered ones.

83. The fork-like disposition of the veins of the leaves in certain ferns, and in the *Salisburia*, has a kind of parallel as to its rarity in the method termed "feather-like." There are many more examples of the feather-like than of fork-veined leaves; still they are uncommon, and the echo comes from plants of the most diverse character. For its perfect development we must look to that imperial class of trees amid which the oak and the Spanish chestnut hold first place. The beech, the hazel, the hornbeam, and many other cousins, go shares in the idea, and with every example of its occurrence in this family is associated that pretty form of fruit which the acorn shows most familiarly and intelligibly. Having their fruit always seated in a cup of some sort, sometimes trimmed, as in the oak-tree, sometimes ragged and torn, as in the hazel, botanists term this noble race the *Cupuliferæ* or Cup-bearers. And truly, if not in all, yet at least in the smooth round bowls of the acorn, that have let fall their fat brown treasures as a child drops its toys at the close of its daily summer, and falls asleep, we have cups as perfect and *recherché* as ever Hebe held to the lips of the immortals. Do we want an echo of *these*?

Look at the capsule of the little pimpernel, and the figure is foreshadowed in the most beautiful

manner, albeit each cup is so minute that to hold as much nectar as an acorn-bowl would contain, we should need a hundred of them. These cups, whether of the acorn or of the pimpernel, would have served Helen when she rambled up and down the world seeking a model for the golden vase of matchless symmetry which, with her prayers, she might offer to her gods. She gave up the search, for even the loveliness of plants was not sufficient, and found in her own bosom the model she desired. So true is it for all time, as this beautiful fable is designed to express, that the best we can offer to heaven is to be found in our own souls. If there be nothing suitable there, we shall explore the world in vain; and when the soul is in right order of life, again shall we explore the world in vain to find an equivalent.

34. Exactly what strikes us in the oak and chestnut reappears in the leaves of the elm, a tree having no botanical affinity with the others, and differing not more in the style of its architecture than in the structure and the aspect of its flowers and fruit. The oak and its allies resemble the Begonias in having their flowers of two distinct sexes, the males developed in the form of inflorescence called the catkin. Not so the elm. Here the flowers are bisexual, and every blossom is of the figure of a vase. Many vases stand side by side, and every little company, through the number, acquires a pur-

ple hue. Early in spring they burst forth in knots upon the bare brown branches, and when sunshine comes the tree glows with a vinous tint known to no other. What a magician is this sunshine, and how sweet an emblem of the kindly amenities that flow unconsciously from loving hearts on other bare brown branches than those of the elm-trees, bringing flowers where before was bleakness, converting silence into melody, turning the heart that before was sad into a lute !

35. Nearly the same as in the elm is the venation found in the whitebeam, *Pyrus Aria*, a tree nearly related to the mountain-ash, and marked, like some others of its genus, by the whiteness of the under-surface of the leaves. The lateral veins here, as in all the other trees which have been cited, proceed in perfectly straight lines from the midrib to the margin, and, being equidistant from one another, form sets of diverging and parallel avenues. Like that of the elm again, in every particular, is the venation of manytrefoils and medicks,—those pretty little clovers which have yellow blossoms and spiral seed-pods. Here however the veins are translucent instead of opaque, and there is a strong disposition to echo the veins of the maidenhair, many of the larger ones subdividing as they approach the margin.

36. Why do not people look more strenuously at these beautiful little gifts of untaxed nature ? They were made for our delight, and are some of the

lilies we are invited to "consider." It is pastime enough for a long summer merely to gather the leaves of our simplest wild-flowers and unconsidered weeds, and to examine them, one by one, against the light, or as "transparencies," so that the fantasies of the veining may be learned. When translucent, as happens almost as often as the opaque condition, nothing can excel the beauty of the webs thus brought into view. The ingenuities of lace are thrown utterly into the shade; no mathematician can follow; no artist, save the great round shining one overhead, can transfer them to paper: yet with the aid of a little chemistry the transfer is effected in an instant! A very interesting employment is it, too, this copying of leaves and their veins by means of chemicals and sunshine. The best and cheapest plan is not the original "photogenic," but that which has been named the "chromotype" process. To practise this, sheets of white paper are first washed on one side with a solution of sulphate of copper, and when dry, with a solution of bichromate of potash. This gives the surface a pale yellow tint, to preserve which, and the sensitiveness, the prepared paper must be kept in the dark, say between the pages of a large book. When it is desired to obtain the image of a leaf with its veins, lay the leaf upon a piece of the prepared paper, keeping the prepared side uppermost, and place upon it a piece of plate-glass, so that the leaf may be perfectly flattened against the paper.

The better to ensure perfect flattening, it is well that the leaf intended to be copied should be heavily pressed for half a day or so, in the way that would be done were it intended for the herbarium. Next expose the paper, with the leaf and glass upon it, to the sunshine, and in an hour or two the yellow tint will disappear, except where the leaf intervenes between the sun and the paper. This portion will of course remain yellow; and now, on the paper being dipped into a dishful of solution of nitrate of silver, the outline of the leaf and every vein and veinlet improves itself in vivid and permanent scarlet! So magical and instantaneous is the appearance of the scarlet, that it can be compared only to the sudden illumination of a dark parlour by kindling a taper and lighting the gas. After being dipped in the nitrate of silver, the pictures should be dried by being placed between sheets of blotting-paper and well pressed; and to ensure their retaining their beauty, they should be preserved in some darkened receptacle. The best leaves to select for the chromotype pictures are those of very thin and dry texture, and level surface, such as the beech. Leathery, juicy, and downy leaves are altogether unsuitable.

37. In connection with the subject of the veins of leaves, it is interesting to note the echo found in their frequent red colour though the tissue itself be green. Trees and herbs, products alike of the east and of the west, supply examples; and many leaves that do not

appear sanguine-veined, when looked at as opaque objects, disclose their crimson beauty when held up before the light. A species of dock is so remarkable for its red venation, that Linnæus named it *Rumex sanguineus*. Similar veining is found in the *Echites sanguinolenta*, also in many acanthaceous plants, and in the famous Judas-tree, *Cercis Siliquastrum*. Tradition affirms that the colour entered the leaves of this tree in commemoration of the suicide of the unhappy man whose name has been given to it, the hue having previously been green! Another fine example is found in the *Pyrostria heterophylla* of the East Indies, a member of the Cinchonaceæ; and a very beautiful one in that charming Mexican fern, the *Polypodium appendiculatum*. Even fuchsias often disclose this tint in their veins, as well as certain kinds of Eucalyptus.

38. It remains only to speak of the silvered and gilt appearance of certain leaves. Sometimes the lustre comes of simple hairs, all laid flat and perfectly straight, as in the alpine lady's mantle, the leaf of which seems lined with white satin; also in the *Banisteria* of the East Indies, the under-surface of which seems to have been washed with a solution of gold. The most beautiful of the metallic leaves are those which seem coated with silvery scales, like the skins of fishes, as happens in the oleaster and the *Hippophæe*. In these moreover the particles readily scrape away, and then furnish admirable objects for

the microscope, which, in order to observe them well, should have a polariscope attached. The looking-glass-tree, *Heritiera macrophylla*, furnishes another rich example of the silvered leaf; and in the star-apple or *Chrysophyllum*, we have an additional instance of the gilded under-surface.

Keen observers of leaves will add, however, to these memoranda, in the shape of notes on the *circinate venation* so beautifully illustrated in the ferns and the *Cycadaceæ*, and to a certain extent, in the *Droseras*; also on the very curious echoes we have in connection with *connate* leaves, as illustrated in those of the Italian honeysuckle and the *Claytonia perfoliata*; also in connection with quasi-simple compound leaves, as in the genera *Berberis* and *Citrus*; again in connection with the *phyllodia* or dilated petioles which stand in place of leaves, as in many *Acacias*, and certain *Oxalids*, and probably in certain *Umbelliferæ* and *Ranunculaceæ*; again in connection with the sleep of leaves, the leaflets of lupines and oxalids bending downwards instead of rising, as all others do; and though last, not least, in connection with that beautiful property of certain leaves, which, as in the case of the columbine and the lady's-mantle, enables them to hold spherules of rain and dew.

CHAPTER III.

THE FLOWERS.

39. If the Leaves of plants thus cast their lively echoes from shore to shore, what may not be expected on the part of Flowers,—those sweet harp-strings which, vibrating for ever, preserve to us the melodies of ancient Eden, and by which they will be floated down the ages yet to come? What may not be expected, we say, for the reason that in Botany, as in the history of man, the nearer we approach the chapters that concern the race and lineage, leaving in the rear those which concern the individual, the more diversified and the more exquisite become the phenomena? Doubtless, in the arrangements which bear on personal life and health, the building up of the organism, and the maintenance of its vigour and comeliness, we have endless material for agreeable contemplation—whole suites also of miracles as grand in their kind and in their influence upon our souls, when watched in a reverent spirit, as the miracles long ago wrought in a corner of Asia: still it is in the consideration of that which preserves the dynasty, or, in one word, in the history of Reproduction, that we find the most brilliant and the most fascinating of all disclosures. To reproduction all vital energies have reference from

the beginning. It is for the purpose of eventually continuing the race, as the crowning act of life, that the bird acquires its feathers, and that the little fishes learn to swim in the river; it is for this that the babe slides from its mother's knees, and seeks a wilful and pretty liberty; for this the quick-eyed lizard learns to dart across the sand-hills; to this end work so sedulously the

“ . . . millions of spinning worms,
That in their green shops weave the smooth-haired silk.”

40. So is it in plant-life. The root, in its growth and absorbent powers, has for its purpose the supplying of the stem and leaves with nutriment, that they in turn may supply the flower and seed; the stem is the pillar of the foliage; the foliage, while preparing juices and fibre for the inferior parts, does so less for their immediate and personal glory than in order that by-and-by, when the clarion sounds, the Flower shall step forth, like a maiden to her bridal.

41. Mark at this point the grand and fundamental principle that nothing in the world exists for itself alone, nor only for that result of its existence which immediately ensues. Universally in nature we find things disposed in series, every form and every process bringing forward the results or the life of the one it follows, and all bearing a definite relation to the last and completing one; which last one, at the same moment, is not an absolute terminus, but is

the preface of a new development in similar order. In nature we never see genuine beginnings, nor do we ever see genuine endings, since every ending is itself a beginning; not necessarily on the same plane or in the old apparel, but a beginning nevertheless, as when the faithful affection that has bound two souls, perhaps for years, at last becomes conjugal, and before long, ah, look! what pretty little loves made visible!

Sic vos non vobis mellificatis apes;
 Sic vos non vobis nidificatis aves;
 Sic vos non vobis vellera fertis oves;
 Sic vos non vobis fertis aratra boves!*

[So you, ye bees, who every flower explore,
 Not for yourselves amass the honeyed store;
 So you, ye birds, of wondrous skill possessed,
 Not for yourselves construct the curious nest;
 So you, ye sheep, who roam the verdant field,
 Not for yourselves your snowy fleeces yield;
 So you, ye patient kine, inured to toil,
 Not for yourselves subdue the stubborn soil.]

Man is no exception to the rule. The infant, the child, the stripling, the full-grown "image and likeness," successively bring forward that which a short time previously was the All; and each, in its turn, more and more intensely declares the relation borne even in the cradle to Reproduction.

* The celebrated lines whereby Virgil exposed the deceit of Bathyllus. *Vide* the poet's life in the classical dictionaries.

42. In man, however, the idea and intent are twofold. First there is the organic intent, or the continuation of the species; secondly there is the resplendent privilege of perpetuating human sympathies. For sex and marriage were instituted not simply that men and women should be replaced as fast as they die, and be multiplied right and left, like other members of the zoological world,—though many of both sexes are content to be mere zoological things all their lives, obscure and vacant as cats; sex and marriage were instituted not simply for *this*, but that kindness and affection, honour and faithfulness, gratitude and generosity, reverence and piety, should daily and unceasingly grow and increase. It was to give scope and opportunity to intellect and affection, and not merely to provide an abode for the nations, that God shaped the world in which we dwell: does He not tell us that He created it for His “pleasure,” which is to contemplate noble desires in His noblest work, and to let no desire of a living heart arise in vain?

43. So, correspondentially, is it with Flowers, for these likewise have a twofold purpose. They were added to the plant not merely that every year there should be supplies of corn and fruit for man and quadruped, and on every summer’s day a banquet for the little wizards of the hive, and that the physical integrity of the earth’s green carpet,

with its forests and shady woodlands, should be preserved. All these ends, great and valuable as they are, could no doubt have been effectuated in other ways. The potato, the turnip, the carrot, the beet, and a score of other excellent roots and tubers show plainly enough how both farina and sugar could have been supplied:—most vegetarian animals, from the giraffe down to the caterpillar, subsist upon leaves; and as for the green carpet of the earth, nothing is more evident than that the simple conversion of annual and biennial plants into perennial, and the gift to all perennials of the selfsame power which is possessed by most of the pasture-grasses, would have rendered a seed-producing apparatus superfluous. The power referred to as held by most of the pasture-grasses is the same that we are familiar with in the case of strawberries,—that, namely, of lateral or vegetative extension, independently of seeds; and which is so markedly exhibited likewise in those curious plants which, like the *Dentaria bulbifera*, propagate themselves exclusively by axillary bulblets, seed-pods being almost unknown. In many plants, both useful ones and vicious, flowering is quite of secondary importance, so powerful and extended is the propagation by means of the roots and the underground portion of the stem and branches. Endowed with immense power of vegetative extension, such plants for example as mint are slow to

ripen the seed they have no occasion to depend upon; and though flowers may be produced plentifully, most of them are constantly abortive. Nature, crowded with manifestations of the Divine munificence, is nowhere more admirable than in her unwillingness to expend force and energy where not required.

44. *Why* Flowers were given to plants has, we say, a twofold answer. The first applies to their physical intent; the second to that which they so elegantly signify and prefigure to the mind. And thus are we introduced over again to the magnificent first principle in true philosophy, which is that Nature is a delineation and solution of MAN. Nothing exists in man which is not already foreshadowed in nature; and the world is so crowded with splendours and ideas because of the richness of the powers and prerogatives of the human soul. When a man would understand something of *himself*, instead of inquiring in the invisible realms called "metaphysics," if he be wise he will go into the fields, "consider the lilies," and ask of the birds and of the mountains. To an out-of-door mind all things are guides and finger-posts towards itself, and all the incidents and experiences that make up life are set forth in picture. Upon this principle rests, not only the office and function of flowers, but their *beauty*. That show and lustre of bloom should be identified, as a rule, with the history of reproduction

in plants and trees is as much a part of the Divine order as that the dearest sanctities and amenities of human life should be identified with the growth and the realisation of the conjugal affections. In every particular the histories run abreast. Not only does the energy of the vital processes point from the very beginning towards the development of the flower, but the flower is not unfolded until a certain stage of individual vigour has been reached; there is puberty, that is to say, in plants as well as in man. Did it not exist inevitably in the one, we should never have occasion to notice it in the other. See too how perfectly the flower vindicates its sweet intent. In the fair colours and the delicate outlines, in the fragrance and in the nectar, are presignified the smiles, the music, the chaste and queenly apparel of the bridal morning. By-and-by, when days more sedate have come to pass, the flower proves itself to have been the forerunner and the source of the fruit, which, without the flower as its proëm, could never come into existence.

45. Analyzing a flower, whether showy or unpretentious, it is found to consist partly of delicate leaflike pieces, which are usually conjoined, and constitute the calyx and the corolla; partly of tender threads, which occupy the centre, and are resolvable into stamens and pistil. The functions of these latter organs prefigure those of sex. The pistil contains incipient seeds; the stamens dis-

charge pollen ; and in the joint and complementary action of these two we have the beginning of the life of every seed a plant produces. Every one may note the general nature of the process. Who is there that has not noticed the golden dust of the lily anthers ? To protect the stamens and pistil from cold and damp, from hurtful wind and beating rain, many flowers are so organized that the petals can fold themselves over the centre, and serve the purpose of tent or curtains ; others again, that seem to need large and direct supplies of sunshine, are so constructed as to be able to expand these beautiful tablets, and dispose them like so many mirrors, every petal thus presenting itself to the full force of Dan Phœbus, and reflecting the light and warmth on the parts within. Sunbeams never fall idly, and never do they fall more sweetly than on the weddings of the flowers, unless when they fall from human faces upon human hearts. Most men have somewhere a secret pleasure that is the sunshine of their lives. Ah, how gladly would many die could they once more behold the eyes from which it streams !

46. What then, we say, may not be expected on the part of Flowers in regard to echoes ? In the mode of their disposition on the stalk, in the figure, the colour, the odour, the graceful ways and movements, there is found the most beautiful resonance. It is resonance, moreover, from the remotest parts of the

earth. How curiously the *Hydrangea* repeats the coronet of the *Guelder-rose*! The former is a native of Japan; the latter grows wild in the hedges and moist underwoods of England; the plants possess no very near botanical affinity, yet so like are the broad and circular flower-clusters that each seems twin-sister of the other. This comes of the centre blossoms being small and vase-like; while those of the circumference are flat and neuter, forming a margin like Saturn's ring. Not far from the *Guelder-rose*, considered botanically, yet sufficiently distinct to disallow popular comparison, are the plants which constitute the family called *Umbelliferae*. Here again the Saturn's ring idea is presented, especially in the cow-parsnips, the great flat umbels of which seem, as soon as they open, to begin to dissolve.

47. How beautiful again the *chaplets* in which many plants arrange their flowers, especially certain members of the pea-family, and certain of the heaths! These, though unpossessed of the slightest botanical affinity, instead of disposing their blossoms according to the fashions that lie around, display them in horizontal stars, the rays of the star being composed of the separate flowers, while the pivot forms the apex of an erect and slender peduncle. Such is the arrangement in the *Coronilla*, the *Hippocrepis*, and the coronet lotus, or *L. major*,—that shining golden flower which in autumn makes the hedgerows of

England seem decked for some royal festival. The heaths in which the chaplet occurs are natives of the Cape of Good Hope; beautiful plants with flowers that seem tubes moulded of porcelain or wax from Hymettus, every blossom swelling as softly as the outlines of the graceful Three, and expanding at the extremity into a cross of different hue, emerald superadded to rose, or rose-colour to pearly white. Less perfectly represented, the chaplet occurs likewise in many species of geranium, plants again without any affinity to the lotus. Here however the pedicles of the individual flowers are rather too long, and the blossoms are too large for the circular symmetry observable in the others.

48. Equally pretty as an example of echo in inflorescence is that one found in the Scabious, one species of which, called *atro-purpurea*, is common in gardens. The whole genus represented in this plant bears its blossoms in hemispherical heads so dense and compact as for the cluster to seem but a single flower; and in truth, for bouquets and other artistic purposes, a single flower it is. Carefully examined, the head is discovered to be a cone or pyramid, built up of many scores of blossoms, the anthers of which are tossed up like so much silvery or lilac spray, and make the beautiful convex seem powdered. In Britain grows a striking though somewhat rustic species, called by botanists *Scabiosa arvensis*. See what odd foliage! The leaves near

the root are long and narrow, somewhat resembling those of the willow-tree, and with unbroken margins. A little way above they gradually acquire lateral notches, the first in the series thrusting out a kind of thumb, the next producing a thumb upon each side, the next having three thumbs, the next four, and so on, step by step, the uppermost becoming pectinated, or fashioned after the manner of a piece of the backbone of a fish. The flowers form blue-lilac mounds, an inch and a half across, and combine charmingly with the scarlet poppy and the yellow marigold. Like the agrimony and the silver plantain, this pretty scabious is fond of slipping out of the fields that it may peer from the wayside bank at the passing traveller. Is this a simple and meaningless "accident"? Does there not often seem in plants something more than the simply vegetative life? Not that there is need to suppose that they do actually possess anything more; but in these odd and entertaining manners and customs, every plant having its own, do they not seem to possess a kind of intelligence and consciousness? Animals and birds scarcely conduct themselves with more evident consciousness of what is going on around them, than in a thousand places, every day during the summer, we may fancy we witness on the part of vegetation. A thousand times, during our country walks, may we notice the wild-flowers of the meadow and hedgerow behaving, so to speak,

as though they knew that they were living in a world inhabited by men and women, some of whom ere long would be looking upon them curiously and affectionately. Such life and sensitivity we know quite well is no part of the constitution of the plant. At least there is not the slightest reason to suppose so, nor does analogy give the slightest countenance to the idea. That there should be something *like* life and consciousness is, nevertheless, most reasonable and consistent, seeing that these beautiful things, these trees and flowers, honeysuckle, lily, and lotus, prefigure and foretell human character and human actions, and are placed beside us as interpreters of the mysteries of our own nature. In bygone days it was actually believed that plants had feeling and consciousness. In bygone days, did we say? Yes; and in modern ones likewise has the amiable illusion been accepted. "Who is there," says one of the most accomplished of British essayists, "who is there that has not seen woods of such singularly expressive beauty, and heard such sounds among them, as to have a feeling that they were animate? Do not these very trees love to bend and lock, '*consociare ramos,*' in sweet converse and salutation? It is not difficult to adopt Wordsworth's belief of their enjoyment of the air they breathe."* Many of the poets have gone so far as to make trees and

* Rev. John Eagles. "Essays," p. 142.

flowers feel sympathy with man. Very elegant is the idea, but sadly abused in treatment; and after all, it is a much less elevated poetry than that which contemplates the lofty *indifference* of nature, all the processes of which go on independently of man, and without respect to him, in so far as regards his personal and individual experience, whether of gladness or of sorrow. Nature is everywhere parallel with mankind, but it nowhere concerns itself with thee or me.

49. The truth, as we have said, is that these sweet things, these flowers and trees, lotus and honeysuckle, scabious, and agrimony, and silver plantain, exist in the world as intimations and prefigurements of what in mankind is realized and fulfilled. Therefore they must needs seem to sympathise; also to have their ways, their manners and customs, all in turn anticipating something human. This is the source of the picturesque science called the "Language of Flowers," which, rightly viewed and understood, is no capricious and arbitrary association of certain sentiments with certain herbs, but the philosophy of the harmonies that were instituted in the beginning, between vegetable nature, on the one hand, and our own souls upon the other. How exquisite are these supplementary enrichments of creation! We thank God, as we ought, for our daily bread, and for prosperity in the undertakings to which we address ourselves, and for our physical

health, and for the return of fine weather; how slow are we to remember that a right and consistent piety thanks Him as reverently, and as gratefully, and as constantly for all such excellent additions to the beauty of the world,—since if there were no such concords of flowers and plants with our thoughts and feelings the green and blossomy earth would be to us like voiceless birds. Here, at least, it is scarcely true that it is the lover who makes the beauty; for though nature opens her stores in proportion to the amount of seeing eye that we carry with us, it is not *men* who insoul the world, but God who does it for the watchful and the earnest. The Language of Flowers was not contrived, as some think, by the Orientals; nor is its extension among the Saxon races owing to the industry and the ingenuity of certain ladies. In its integrity it is a part of the very method and order of nature; and, although much misconceived and misrepresented, the day will come when it will take its rightful place among the sciences. Time, which soon consigns to oblivion whatever is unimportant, brings to light and establishes whatever is truly great. It is an integral portion, moreover, of genuine botany, which does not concern itself alone with forms and surfaces, but rises from these considerations, after mastering them, to scrutiny as to how plants procure their living, what they have to say for themselves, alike for the glory of God

and the delight and instruction of man. He who stays among the forms and surfaces is only a vegetable anatomist,—expert and learned, it may be, as to externals,—but he is no botanist till he asks, “What do these things signify?” Both occupations are good: let neither observer look with disparagement on the other: one is Lucretius, enumerating the phenomena; the other is Virgil, extracting and portraying the loveliness.

50. Return however to the lilac field scabious. It is echoed, just as the leap of a man is imitated by a buoyant and aspiring child, in a delicate little blossom called *Jasione*, a flower of the fairest azure, arriving with the earliest gleams of the purple heather, and mingling on the hedge-banks with the shining panicles of the hair-grass,—so sweet and enduring are the companionships as well as the teachings of nature. What renders the echo more striking is that it comes from one of a family so noted for the bell-shape of the flowers that the patricians among them are called *Campanulas*. Everywhere in botanical nature we find on the frontiers of the family-groups some anomalous yet inseparable member. In every group some wayward plant runs down to the river-bank that margins the home of its kindred, and hovers on the brink, as if striving to escape. Just like this bright little *Jasione*, in turn, is the *Gilia capitata* of Columbia, which, belonging to a totally different

family, and separated as to its birthplace by thousands of miles, yet repeats it in every particular of hue and aspect. Another of the Campanulacææ, called *Trachelium cœruleum*, exactly imitates the figure and complexion of a valerian. The occurrence of such phenomena, totally at variance as they are with preconceived theories, forbids us to deny or disbelieve anything. Imbedded as we are in the mysterious (especially in regard to the invisible), our wisdom is to wait rather than to reject. A man who prides himself on his sharpness in discovering the error or defect of his neighbour's opinions is sure to become ridiculous in his own person before long. It is well that we should often be startled, for every shock given to our old impressions is the beginning of a newer and loftier insight. Therefore should we be glad that these little azure flowers exist; in every one of them is warning not to conclude and decide too soon.

51. Other examples of echo in respect to inflorescence are found in the singular forking clusters of many of the *Stellaria* class of plants, when compared with those of such of the *Gentian* race as are illustrated in the *Chlora* and the *Erythræas*. The singular way in which a solitary flower stands between every pair of forking branchlets attracts the attention of every young herbalist, and forms one of the best characters in each of these two classes. Other echoes again are found in the incurved

racemes of nearly all of the Borage family, when compared with those of the Phacelias and of the Heliotrope; also when they are compared with those of the sundews, the white flowers of which elevate themselves one by one, just after the manner of the turquoises of the forget-me-not. Others again are placed before us in the superb turret-like inflorescence of many of the Bromeliaceæ and of many of the Acanthaceæ, each of which is prettily set forth in miniature by the violet-coloured prunella of the fields; others again by the long and attenuated flower-spikes of many of the pepper family, and many of the Araceæ, which exactly resemble the tails of little mammals.

CHAPTER IV.

THE BRACTS AND THE CALYX.

52. FROM the inflorescence we move to the Calyx—that elegant cup which encircles the petals, and is often quite as gay and brilliant as the corolla. There seems to be in plants universally a spirit of aspiration and emulation. Not only do the lower and humbler forms strive to place themselves abreast of the higher ones, or at all events to creep nearer to them, as the bees strive to be nearer their queen; not only so, but every organ and member manifests, in one species of plant or another, this same earnest and persistent tendency upward. The floral world is literally the Realm of Aspiration. Roots assume the forms of stems and branches; branches become leaf-like; leaves, in many cases, so paint or dye their substance that they excel many actual blossoms. This we find well illustrated in the splendid genus *Caladium*; also in *Dracænas* and *Gesneras*, and in many species of *Maranta* and *Eranthemum*. As for the leaves of those most lovely little terrestrial orchids of the East Indian Archipelago, called by the scientific *Anæctochilus*, they seem carved out of the richest brown or emerald velvet, then laced and em-

broidered with filaments of gold and silver, reminding us of Arachne and her handmaidens:—

“ Illic et lentum filis immittitur aurum ! ”

[Here too the pliant gold is interwoven with the threads.]

Plants of this kind, or such as are remarkable for their painted and variegated leaves, are now so common in conservatories, and are become so fashionable (for there is fashion in floriculture as well as in costume), and new ones are so eagerly sought for, that whoever a hundred years hence writes the history of gardening in the nineteenth century will have to describe it as memorable for its phyllomania.

53. Just like the aspiration of the leaves is that of the parts which succeed the leaves, both physiologically and in point of time, namely, the bracts in the first place, and subsequently the calyx. The bracts are those leafy pieces which in many plants, but by no means in all, stand intermediately between the ordinary foliage and the outermost portion of the flower. They frequently present petaline forms and colours, and form an exact transition from the work-day green of the leaf to the festival hues of the blossom. How grand they are in the coronet spurge,—*Poinsettia pulcherrima* well called ! This noble plant is one of the Euphorbiaceæ, and a native of the hottest parts of tropical South America. Everywhere it is saturated, like its conge-

ners, with milky sap; and like most of those congeners, it is possessed of very simple and unattractive flowers. The glory lies almost wholly in the bracts, some of which retain the angles characteristic of the leaves, while the rest, gradually becoming narrower, constitute what seems at the first glance a superb scarlet corolla, eight or nine inches across, but which, like many other things looked at too hastily or too far off, acquires quite another significance when viewed nearly. For the genuine flowers are the yellow and scarlet beads in the centre, every one holding up a vase of honey, as if in a tiny seashell. Sometimes a bract is partly green and partly scarlet, so that everything is presented which is needed to the illustration of the gradual change. Many other plants of this family give similar examples of bracts emulating petals, especially the true Euphorbias, as *Euphorbia splendens*, a native of Madagascar, which seems to possess five-lobed corollas, and reminds us of the rural pimpernel of Europe, whereas in truth these *quasi*-petals are only bracts intensely coloured. It is worthy of observation that whenever a subordinate part of a plant successfully emulates the aspect and complexion of a higher one, the latter foregoes its prerogative, and though retaining all its functions and usefulness (except occasionally when it is the leaves which give place), becomes comparatively plain and unattractive. How beautifully does this prefigure the

kindly spirit of those manly and loving souls, yea, more particularly the spirit of those womanly souls, who, when honour and enjoyment are to be had, prefer to stand back, and let the less privileged with opportunities come to the front, content in the quiet performance of daily duty, and sunning themselves in the delight they have yielded to others! Thus behave not only those illustrious spuries of the tropics, but the pretty little Canadian Cornus, and that other, called the *Suecica*, each of which seems to produce a solitary flower of four white petals, whereas the seeming petals are only four large bracts, many purple blossoms abiding overlooked within; thus too behave those beautiful sage-like plants called Clary, the bracts of which are either violet or rose-colour, and grow in tufts upon the summits of the slender stalks. Note, at this point, how curiously the petaloid calyx of the *Mirabilis* or marvel-of-Peru, and that of the *hepatica*, are alike provided with a green involucre which makes the calyx seem corolla.

54. Giving attention more particularly to the echoes found in the Calyx of the flower, take in the first place those occurring in connection with the number of pieces of which this organ is composed. In corollas of the rosaceous type, the rule is that the pieces shall be *five* in number, sometimes conjoined by the edges, sometimes separate, and removable one by one, when they are called "free." Con-

trariwise, in flowers of the liliaceous type, the rule is that there shall be three such pieces ; and in both classes there is generally a numerical correspondence on the part of the petals. These two types of flower, the rose-like and the lily-like, comprise the great mass of those known to botanists ; certainly they are the most splendid and fascinating ones. All plants, in fact, that bear evident flowers belong to one or other of the two glorious queendoms, the acknowledged heads of which are rose and lily. By no accident of botanical systematizing does it happen to be so, nor was the marshalling of plants after this manner invented by man ; it is an original and Divine reality, one of those grand and elegant principia of nature which are anterior to all scientific contrivance, and which will endure for all time, an everlasting miracle of delight to open eyes. Beautiful too is it to note in passing, that in the united sovereignty of these two flower-queens we have not only the summary of all that is loveliest in the realms they preside over, but the prefigurement of that sweet union of red and white which to Caucasians constitutes the charm of the human countenance : " My beloved is white and ruddy." Altogether there are four great primary classes of plants, two with evident and usually conspicuous flowers, having for their respective centres the rose and the lily ; and two in which the fabric is much more simple, and the flowers are microscopic. These

latter have for their centres and queens the pretty branching moss of the woodlands, and the graceful and film-like organisms called sea-weed. Neither calyx nor corolla, nor even true stamens and pistils, are found in the two last-named. They are nevertheless not a whit less interesting than the most majestic plants ; and for that matter, when we come to examine them carefully, perhaps they may be found in interest to surpass even the largest. Somehow, when among these mere fragments of nature, its minims and monosyllables, we seem to list her most captivating tones ; just as in the recesses of a gray cathedral, away from the grandeurs of the pillared scenery, where sweet, soft, tinted light steals gently in, we feel ourselves in sanctuaries of special joy. Of God, the Framers of all, how eloquently was it said by a pious one of old, *in minimis maxime miranda !* Exceptions and deviations as to the number of calycine pieces occur, without doubt, in the two great queendoms of rose and lily ; whole tribes belonging to the former have only *four* pieces to the calyx, and the same proportion only of petals, as for example the fuchsias, the evening-primroses, and the woodruff. The predominant numbers are nevertheless what we have said ; and that the four-petaled flowers are so in consequence of some singular law of non-development, not yet visible to man, is proved by the incessant effort of individuals to attain the full or fivefold character.

Not a summer passes without fuchsias and evening-primroses presenting plenty of examples of quinary blossoms; and in the Galiaceæ (to which the white-crossed woodruff belongs) *Rubia peregrina* is almost constantly pentamerous. Some people have been so heedless as to call these unusual states "monstrosities," as if to approach nearer to normal types were departing from them! If legitimately applicable in any case, the term "monstrosity" should be given only to malformations clearly the result of accident, and to conditions induced by disease or the attack of malignant enemies; seeing that everything which comes of the spontaneous play of the forces of nature, which are always benevolent in design, and never invade any law of order, must needs illustrate and help to interpret something absolutely good and true. Beautiful tendencies in the direction of the archetype, such as we see in the quinary fuchsias, are to be looked upon not as "monstrosities," but as another portraiture of that sweet and simple way of God which loves to make the speechless thing give lessons in wisdom to speaking man. Very exceptional deviations from the typical number, such as occur in that dainty sylvan flower, the *Trientalis*, which has its parts always in *sevens*, are like sea-birds which, having lost their way, after conflict with wind and tempest, every now and then make their appearance far inland, and for a moment are perplexities, but

which presently disclose all to the calm interrogator.

55. No example is known among the liliaceous tribes of an echo of the pentamerous structure of the rose; the reverse, on the other hand, is met with frequently, as in the berbery flower, which is ternary in every part; also in the golden pile-wort, *Ficaria verna*, which has a calyx of three sepals and usually nine petals. The princely magnolias, so many of which ornament the warmer portions of the United States, though the maximum of their grandeur is reserved for the lower slopes of the Himalayas, likewise show the threefold calyx, and in this case again six petals; we find it anew in some very singular Japanese climbing plants called *Akebia* and *Lardizabala*, in the whole family of the Menispermaceæ, in some of the poppy-family, such as the Californian *Platystemon*, and in that handsome semi-aquatic, the purple-spiked *Lythrum*. Nothing can be more unlike the liliaceous type than the plants enumerated, nor have they any immediate affinities between themselves; still they agree in this remarkable concordance with the lilies in matter of calyx.

56. Instead of echoing the rosaceous type by adopting the pentamerous structure, the liliaceous plants, when they exhibit parallels, do so in matter of colour. To apprehend this very curious fact, we must remember that liliaceous plants differ from almost all others in having their calyx and corolla of similar hue

and texture, so that to appearance they have *no* calyx, and the flower seems composed of six petals.

57. In the days of Linnæus, and until a comparatively recent time, the appearance in question was mistaken for the absolute truth, and flowers with petaloid calyxes were termed "naked." Strange that man should apply such a term to objects with the gorgeousness of whose appearance even Solomon in his royal robes might not compare. It is now demonstrated that the flowers of the liliaceous tribes, so far from being left half-clad, not only possess the accustomed outer portion, but that in tint and texture it matches the inner one! Both elements of the floral dress are present, agreeing in richness and embroidery; and if it seem otherwise it is the eye that is dim to perceive. Happy the day when men shall carry in their right hand, as the axiom to precede all others in searching for the truth, that God has left nothing unfinished or imperfect, and that it is human sight that has to be quickened to right seeing.

58. The almost universal prevalence of this state of things in the liliaceous tribes renders it then the more remarkable that here and there among them there is perfect echo of the *green* calyx, which, after the same symmetry of purpose, is the rule with the rosaceous. The flowers which show it most conspicuously are the spiderworts, botanically named *Tradescantia*, in honour of that fine old naturalist

who in London, nearly three centuries ago, was one of the first to form a museum of curiosities. The spider-worts are not uncommon in gardens. The species called *Virginica* has grassy foliage, and dense umbels of blossoms, usually of the deepest violet-purple, with stamens of the same colour, except that the anthers are golden. Look, however, underneath; and, instead of the purple calyx we should expect, the sepals are grass green! So is it with those pretty inhabitants of the swamps and marshes, called *Alismas*; so is it with the very pretty North American flowers called *Trillium*.

59. Conformity as to shape in that outermost covering of all, which, in connection with other resemblances, brings together the members of the vast race called the Composites, or daisy-like flowers, is strikingly illustrated in the gay Mexican marigolds botanically termed *Tagetes*, and in the simple European wayside wild-flower called *Lapsana communis*, and popularly known as nipple-wort, the juice being a specific in rural pharmacy at the time of weaning. Most pleasing it is to note how these two, so widely unlike when in bloom, with the approach of autumn gradually resemble more and more, till, in the end, when the leaves are cast away, and the stems and branches are bleached by the frost, they are brought to an exact similitude, except in size. Cold weather, that strips away the purple and fine linen, brings out the identity of more things than the proud *Tagetes*

and the nipple-wort. When the temporal ornaments are stripped off, and only the bones are left, how often (alas ! how often too late for love and gratitude) we discover that all our lives, close alongside of us, thought to be only a wayside weed, there has been working, for God's glory, some hearty, honest, living, loving soul, no less perfect in the sphere assigned to it than the greatest among those who occupy the chief seats and are called Rabbi.

60. Sometimes the calyx of a flower, like a summer's eve, departs with reluctance,—yea, like the western eve, and the expiring dolphin, and the sugar-maples, becomes more lustrous than while in its prime. Such happens with the calyx of the alke-kengi, or winter-cherry, aptly so named, since this portion of the flower, though green while young, in advanced life assumes a deep-red colour, and closes over the berry within, forming a globular cage for it. Similar persistence is shown in the calyx of many species of staticë, or sea-lavender. In these, while the corolla is white or yellowish, so extraordinary are the sports of nature, the sepals are *blue*, constituting perhaps the only example in botany. For, as we may have opportunity of illustrating by-and-by, while nature so loves to reverberate and reiterate, she pleases herself too in the fabrication of things *unique*—unique, at least, to existing knowledge ; and of these there is certainly no prettier instance than the blue calyx of the staticë.

Of course we do not here include the coloured calyx of such blue flowers as the squill and the sylvan hyacinth, which hold their tint by virtue of the liliaceous nature of the entire plant. It is of a blue calyx in an exogen, or one of the rosaceous type, that no other example known to me occurs, unless indeed casually in such flowers as the Wistaria, and then it is not in *contrast* with the corolla, as in the staticë, but in conformity with it. Ordinarily, the blossoms of these plants, the staticës, are produced in large clusters, and thus, though individually small, they become gay in their sweet concourse. The white corollas, which may be compared to minute jasmine flowers, seldom endure long; many people would hardly notice them; but, when departed, just as sunset is more lovely than noon-day, pleasing the more by dazzling less, they leave behind them, as it seems, a new supply, dyed, we might easily believe, in those serene blue altitudes where the larks and our wishes go, and that holds faster than before on life and human delight.

61. These plants may be grown in almost any garden. It is one of the specially charming attributes of nature that her best and loveliest things, her most entertaining riddles and her quaintest fancies, all lie ready for the earnest inquirer and the desire to possess. There is no monopoly of the things of the kingdom of God, nor is there any oligarchy in the control of them, whether it be truths for solace

of heart, or objects made to gladden the understanding. They are every man's, without money and without price. Emerson tells us that no man holds the title-deeds to nature's great estate; equally true is it that every one who cares may have a sight of the alkekengi and the staticæ. Every boy who has a flower-pot, every girl who has a parlour-window where geraniums are permitted, or privilege, better still, to use a little greenhouse, may cultivate and call these pretty curiosities their own; may sow the seeds, or plant the slips, and watch them grow, and find after half a lifetime that, in renewing the little experiment (like opening the pages of some book that thirty years before taught us how to think and how to see), they shall still be an enthusiasm, and the key-note of a poem all unawares made in the mind, though perhaps not a word may be uttered. The true way to be happy in old age is to learn to love such things as these in our early youth, always connecting with them reverent thoughts of God's wonderful ways and dealings. Interest in them never departs or fades, though opportunities for the practical enjoyment may be suspended; and in the end we are like the mountain-ash trees, which, flowered over with creamy and odorous clusters in early summer, though for awhile afterward they have little but leaf to exhibit, in autumn are decked to the utmost fringe and highest pinnacle with glowing scarlet. The time for lofty pleasures

never passes away. It is not lapse of years that deprives us of them so much as neglecting to provide a plane for their renewal while we are still in our early vigour. I see, too, in these beautiful statics the perfect image, or rather prefigurement, of a great book, which is distinguished, not by the influence it may exert upon us the first time of perusal, as by its having new and sweeter rewards for us when we return. Not that which delights on the instant, even though it be to rapture, is thereby proved the most excellent, but that which, after many days, when we go back, perhaps in trouble, we find a spring of refreshment, and to possess not only a fair face, but a loving heart.

62. Like the sea-lavender calyxes, in respect of heightened colour and second lease of life, are the flowers of many species of *Rumex*, the genus which comprises the sorrels and docks of northern temperate latitudes. While in bloom, these plants receive exquisite beauty from their innumerable stamens, which are pink and amber, and suspended lightly as the leaves of the aspen-tree, so that, with the least touch, the whole plume of inflorescence is made to quiver. During the progress of the seed toward maturity, three of the six calycine pieces (for in structure we again have an echo of the liliaceous type) become greatly enlarged, and acquire wings that, along the margins, are of a bright-red colour. The stalks of these, like the

filaments of the stamens, are fine as hair, and again, with the least touch, the whole cluster trembles and quivers. We seem at the same moment to have a new display of flowers. No ; it is but others of the original company newly dressed Cotton-sedges, which, instead of a perianth or proper blossom, possess only a few stiff bristles, analogous to calyx, so elongate these during the ripening of the seed that the cluster, before so void of attractiveness, is converted into a tassel of the most lucid and pearly whiteness. Bleak and desolate moorlands, which for the greater part of the year lie still in black sterility, are rendered by these beautiful cotton-sedges, for a few weeks in early summer, not only gay and cheerful, but luminous, only let there be a beam of sunshine. They remind one of poor prisoners and captives, spending long dreary days and nights in solitude and perhaps in chains, yet made bright—oh! happy days, how few and far between!—by the sight and kisses of wife and children. In the little morasses among the seaside sand-hills may likewise be found this pretty plant, which there seems whiter still, fit image this for the old Gaelic bard when he wanted an emblem of his heroine.* So gloriously does nature bring life and brightness out of gloom, and convert all things, in their turn, into prophecies of love and rejoicing. Who need murmur that the “golden age” is gone away, never, as they say, to return,

* “Her bosom was whiter than the down of cana.”—*Ossian*.

when every summer there can arise such sweet denial as this !

63. Another instance of a quasi-second crop of flowers, resulting from growth of the calyx, occurs in that pretty trefoil called the *fragiferum*. Many flowers stand side by side, and when the seed is ripe we have a beautiful sphere of pinky vesicles, far more noticeable than the blossom which precedes. Another instance again of arithmetical agreement is furnished in the calycine part of many plants of the strawberry kind, and in the corresponding portion in many of the mallow family. These two races have few features in common, but agree in possessing an "epicalyx," a robe, as it were, in addition to the dress, just as the knights of old wore a tunic above their armour. The aspiration so grandly realized in the chief liliaceous tribes (the calyx in which rises, almost always, into the petaloid condition), has echoes also, it should be added, not uncommonly, in species and even in genera, among the rosaceous. Sometimes the aspiration is realized completely, as in the flowers of the berberry, which has a calyx of the same golden hue as the petals: sometimes it is only partially realized, as happens with the candytuft, in various Brassicas, and in other crucifers: and sometimes, as in the Polygala and the Mussænda, the aspiration is confined to a single sepal, or to a couple of sepals,—a circumstance which brings the last-named into very

curious echo. In no degree related, we yet find these two plants compensating the inconspicuousness of their corollas by an immense and beautiful development of the sepaline parts. The *Polygala* converts *two* sepals into what seem at first sight to be petals; the *Mussaenda* changes only *one*, but this into an appendage of such extraordinary size, and so remarkably contrasting in colour, being pure white, and an inch or more in breadth, that we might suppose the shrub the resting-place of a score of white butterflies. One more resemblance to liliaceous plants, on the part of rosaceous ones, in the matter of petaloid calyx, is found in those singular varieties of *Primula* and *Azalea*, which are familiarly called "hose-in-hose."

64. Corollas supply resemblances of the most varied kinds. Some correspond in figure and outline, whence the terms rotate, vase-like, trumpet-shape, cruciform, etc.; others agree in tint and complexion; others in a beautiful quality which can only be compared to what in the human countenance is called Expression. Most of these resemblances do not come within the idea of echoes, being simple and ordinary types of structure running all through the world, and on a level with the customary shapes of leaves. Such for instance are the resemblances between the corollas of the buttercup and the silver-weed, of the lilac and the wood-ruff, and of the primrose and the phlox. There are

plenty of charming facts, nevertheless, which may legitimately be classified with the illustrations of echo, and these are discovered, not uncommonly, alongside of the preceding kind, as when we find the crocus repeating the form of the colchicum. So, while among the Endogens, in the liliaceous tribes, the members of that marvellous orchid race declare themselves on the instant by the pendulous lip of the flower, among the Exogens the same is done by the Labiates. The fig-marigolds of the Cape of Good Hope repeat, in their starlike flowers of multitudinous petals, the beautiful radiancy of thousands of the daisy kind; the willow-herbs renew the idea of the wallflower; myrtles echo the hawthorn; the pyrola seems striving to be a lily-of-the-valley.

65. Note yet further the curious similarities induced by the vestures of certain corollas, in the Australian Correas and the Anigozanthos or funeral-flower shown perhaps more remarkably than in any other plants. The former are exogenous shrubs, the latter are herbaceous, and not far removed in affinities from the lilies. In both, however, notwithstanding their total unlikeness in all other particulars, the entire surface of the corolla is covered with a roughness, which, on being examined with the microscope, is perceived to be given by myriads of little branching or stellate hairs, in the funeral-flowers shaped like fir-trees. The name of "funeral-flower" is applied to this very singular genus on

account of the stalks and other portions of the inflorescence being often shaggy with similar but larger and stronger hairs, which constitute a velvety covering, and being usually of a dark purplish or other lurid and sombre hue, give the idea of the paraphernalia of stately obsequies.

66. In connection with these curious hairs and vestures, let us here again recommend the purchase of a binocular microscope by every one who is interested in the wonders of nature. Giving the stereoscopic or natural aspect to the objects examined, the charm of its use is inconceivable until tried. It is especially adapted, moreover, to low-power objects, or such as only need to be moderately magnified; and if I mistake not there is in the examination of these, by intelligent minds, such delight of eye yet to be experienced as stands without precedent in the history of human pleasure. The only parallel to it is to be found in the influence of music; and thus is illustrated over again that God's noblest and loveliest gifts and benignities of deed always run in couples: one masculine, the other feminine; one for the head, the other for the heart; one for the eye, the other for the ear. It must needs be so, since Infinite Love and Wisdom cannot act apart, and by the law of their own nature express themselves everywhere in echo. Who has not felt the still music of a fair blue sky, and the harmonies of light and shade in the shifting and tinted clouds?

Who has not perceived in the bars and chords of genuine music, that form and tint, in the hands of a master, may be made audible ?

67. While speaking of the corolla, here too we may advert anew to that elegant capacity for change of attitude in the component pieces which declares itself in the frequent closing of the flower toward nightfall, and the phenomena of which change constitute the "sleep of flowers." These movements, as already stated, are of the most varied kind, and depend of course, in large measure, upon the particular figure and disposition of the petals. It is obvious that different arrangements of the petals must needs involve different methods of shutting up, just as among birds and animals the attitudes of sleep run abreast of the peculiarities of the creature's structure, and of its habits, while awake. The flowers of the daisy-family draw their petals together in such a way as to form a conical pent-house over the centre, and the same happens with the fig-marigolds. The poppies roll their two inner petals into a cylinder, and simply elevate the two outer ones. The pea, the lupine, and their allies, fold the upper petal into the shape of a saddle, and then bend it over the subordinate ones. Other flowers twist themselves into spires and cones ; while not a few assume the imbricate condition, or such as we witness in the crocus. In every case the principle of *protection* is vindicated.

The tender interior parts are sheltered from cold and wet, and at the same time there is extra facility given for the conveyance of the pollen from the stamens to the pistil. Yet, after all, it is not "sleep," properly so called. Plants never really sleep, though they do undoubtedly receive some kind of benefit from being left in a state of quiescence. Sleep, properly so called, can only be experienced where there is a nervous system, and where, during the day, there is expenditure of nervous energy. No such system exists in plants, nor do they ever expend force, prodigious as are their powers of growth. Plants express the conservative and centripetal half of organic life. They represent the architectural and sanitary forces of nature. They collect, concentrate, consolidate, and then hold in readiness, the material upon which animals, the destroyers and wasters, depend for sustenance. In themselves, though they feed and drink, they never devour or destroy. Their appetite has for its simple and provident end, the storage of nutriment for the use of the nerve-possessors. To the world, in its totality, plants are what woman is to home: wherefore their sweet beauty; their pretty tendrils, emblems of clinging and confiding affection; their calm unselfishness, their immortal solace. Did not woman keep things in their places, provide for the famished and weary, set the example of early hours, morning and evening; receive good deeds

tranquilly, and patiently bear evil ones; do all things, in a word, that plants do, in their unfathomable generosity and pretty charities of leaf, and flower, and fruitfulness, how utter and speedy the collapse of human society! In woman lie all the hopes of the world. Man may suggest, but it is woman who gives to all true reforms their vitality and efficiency; for if not rooted in the family circle, and with love to set them going, theories, however excellent, must needs shrivel and die. Just so is it with vegetation in the economy of nature. Early and late is every leaf at work, converting water and atmospheric elements into wholesome saps and juices. Were the work to cease, the world's granaries would be no more; man and every animal would starve and perish. Green, the appointed hue of plants, may well be the emblem of Hope. Hence too is the emerald, which in colour is the reflection of the plant, the symbol of immortality and rejuvenescence, and, associated with pearls, the most fitting and honouring gem a woman can wear.

CHAPTER V.

THE STAMENS AND THE PISTIL.

68. Next interior to the corolla are those pretty organs of the flower called the Stamens. Normally, these consist of a slender pillar, termed the "filament," and upon the summit of the filament a little box, ordinarily of two compartments, and called the "anther." Within the anther is lodged the "pollen," a powder thrice more precious than that famed one of the alchemists, for upon that depended only gold; whereas to the pollen we owe the restoration, year by year, of the vegetable beauty of the world. In many flowers the filaments are extremely short, so that the anthers seem destitute of support; in others the filaments adhere so closely to the surface of the petals that the anthers appear to emerge from them. Scarcely could we suppose, at first sight, that in so simple a structure there could be scope for much variety; yet every possible change as to number, position, form, and colour, is rung upon these protean little bodies; and since the examples of stamens amount probably to quite a hundred thousand,—every flowering-plant and tree in every country under heaven being provided with them, under one condition or another,—there is not only assurance of very charming

repetitions, but expectation is rewarded with the earliest dawn of spring.

69. Look first at the circumstance of number. As a rule, the stamens exceed the pistils, the predominant number of the former being either three, or five, or twice as many; while in the great majority of flowers the pistil is solitary, though internally often composite. The families in which a considerable number of *distinct* pistils occur commonly are the Rosaceæ, the Ranunculaceæ, and the little group named after the Alisma; and it is a matter of curious observation that the two last named, as already mentioned, contain the only examples, hitherto noticed, of the number of stamens being *lower* than that of the pistils. To a mound of pistils the water-plantains and the mouse-tail respectively adjoin only six or nine stamens, while in the ivy-leaved water snow-cups there are usually not more than five, the female portion of the flower being developed perhaps fourfold. A few examples occur of solitary stamens. These resolve, in every case, into illustrations of that curious withholding of parts and organs (popularly and rudely called abortion) wherein nature delights to show us how easily, and at the same time how most thoroughly, she can accomplish a given end after apparently cancelling the means and instruments. Contrast, for example, the regalia of the lily with the simplicities of the Hippuris and of

the water star-weed, these two being totally destitute of perianth, and having their solitary ovaries fertilized by solitary stamens. A tenant of quiet pools, the Hippuris elevates to the height of some twelve or eighteen inches above the water an unbranched stem, crowded with decreasing whorls of linear leaves, at the base of every one of which lies what seems only a minute red bead. Similar in habitat, the water star-weed roofs its abode with green rosettes, amid the folds of which we may espy, when the sun shines, one or two tiny anthers. The interest of these plants is great, for the Hippuris is allied to the fuchsias and evening-primroses, and the water star-weed to the brilliant Euphorbias, each in turn exhibiting the least form in which a given idea can be expressed. The garden supplies the maximum; in the pool we discover the minimum. There are very beautiful examples also of monandrous plants in the illustrious flower-families which include the Cannas (commonly called, because of their hard and globular seeds, "Indian-shot"), the Marantas, the Thalias, Alpinias, and Renealmias. These glowing orientals, with other plants nearly related to them, seem lilies dishevelled by some ill-fortune: at the same time so marvelously beautiful are they in their dismemberment, that we are reminded by them of those grand old classic fables of fair ladies torn from their homes, dismantled, and held in bondage—Andromeda, to

wit, chained to her rock in the immortal sea. The orchids, too, are in almost every case monandrous, and again by non-development of customary parts, anatomy of the blossom showing that, as in other Endogens, the full number of stamens should be three, or even six. There are examples again, very curious in their way, of heptandrous flowers, the sepals and petals of which are also in sevens. The prettiest is the *Trientalis*, already named,—one of those dainty little blossoms which seem the apotheosis of a snow-crystal, and which never wither without our missing them.

70. Flowers such as the orchids just spoken of are considered to be “aberrant,” because of certain great archetypes underlying all diversities of botanical structure, just as certain other great archetypes underlie and interpret all animal organisms. When, accordingly, as in these monandrous ones, anything anomalous or contradictory offers its problem, by the philosophic mind it is at once placed in the light of the archetypal idea, and the so-called imperfection of structure is soon perceived to arise from some curious and deliberate withholding, which at the same moment implies neither poverty nor deterioration. Yet when some of our botanists want a word to denote these admirable illustrations of the Divine skill, they call them “*degraded forms!*” Alas for their love and reverence! Nothing in nature is either mean or degraded;

it is a question only of more and still more curious and beautiful truth than before. Whether archetypal or aberrant, every plant is perfect in its place and way. There is no such thing as an imperfect plant or an imperfect animal, except in that restricted and technical sense of the words which it is occasionally convenient to impose upon them. Rather is it that the individual the term is applied to is so excellently contrived that it can execute its office in the economy of the world, with instruments and after a manner that render the work miraculous. "Nature," says Carlyle, "which is the Time-vesture of God, reveals Him to the wise, but hides Him from the foolish,"—a profound text, the truth of which is nowhere made more manifest than in regard to the estimates men form of the "imperfect." Want of power to appreciate the universality of the ideal truth is, for the man who suffers from it, one of the most unfortunate of incapacities; contrariwise, an equal vision for great and small, perfect and "imperfect," is one of the noblest prerogatives man can rejoice in. Perhaps in this distinction is found the true division of human society; which, as finely put by Victor Hugo, is not so much a question of "happy" and "unhappy," as of luminous souls and dark ones. Happiness is the secondary condition, light is the primary one; happiness is the desired state, light is that which evolves it.

71. Some day it will be shown that the vegetable and animal archetypes are themselves in harmony. Even now we have glimpses of this grand unity in the concord of the form of the star-fish with stellate flowers; in the bilateral symmetry of the labiate plants compared with that of the vertebrate animal; and in the phenomena which pertain to sex. Plants and animals are widely unlike, no doubt, in such qualities as volition and whatever else depends on the possession of nerves: they are exponents, nevertheless, of a single constructive thought, and are to be regarded not so much as two distinct orders of being, as representatives of the dual mode in which the principle of organic life can be set forth. Some perhaps who read these lines will call this "imagination," intending thereby to pronounce the idea contrary to fact and sense. "Imagination" let it be deemed. The experience of men has proved a thousand times, that the heart and imagination have their truths just as the reflective powers have theirs; yea, that their first glance is often abreast of and in a line with the last decision of the reason. Many things look fanciful only because they are so absolutely and intensely true;—true, that is to say, not necessarily in the inferior sense of "matter-of-fact" (since truth and matter-of-fact are by no means synonymous expressions), but in that infinitely higher sense which refers us to the spiritual basis of fact. If what some men slightly

and ignorantly despise as the "imagination" were to die, it would be because truth itself had already ceased to exist. The great point on which we have to satisfy ourselves, call the process what we like, is that our faces are turned in the right direction, truth being of infinite expanse in front, as error is behind; neither way is there any limit. Nature, in a word, to return to the proposition of the archetype, revolves continually upon its own axis, always returning to the point where it began; and widely as we may seem to diverge from it, directly we turn round we are confronted by the well-known countenance, as the eyes in a nobly painted portrait, from whatever point we look, always seem to look toward and meet our own.

72. There are some large companies of plants in which the stamens are very numerous: these organs then surrounding either a solitary, though internally composite pistil, as in the mallows; or a group of many separate pistils, as in brambles, anemones, and roses. Among these occurs a very lively and interesting echo, namely, in that curious condition where the filaments are united at the base, so as to constitute "brotherhoods," and which consociates plants in other respects totally distinct, and geographically far asunder. Take, for example, the Californian *Bartonia*, and the yellow-blossomed *St. John's-worts* of central Europe.

73. The filaments of the stamens are often de-

corated with strings of coloured beads resembling rosaries; and these, like the adelphous stamens, occur in plants unpossessed of the least technical affinity. To the unassisted eye, through their abundance, these delicate ornaments constitute a kind of fleece, as very plainly seen in the Virginian spiderwort. The petals of this flower, the width of which is about an inch, are of the deepest violet purple, and three in number. So perishable are they, and withal so singularly deliquescent, that in the evening of the day on which they expand little remains of them but a shapeless mass of purple pulp. Sometimes the colour varies to pink, and even to white; but whatever the hue, the beads are rich and brilliant, and under the microscope present a singularly charming appearance. Some of the beads are spherical, some are oblong, with rounded ends; and while the flower is in a state of vigour, with a high magnifying power there may be observed in them the phenomenon of vegetable circulation. Just like these rosaries, except that all the beads are spherical, are the strings of cells which grow from the filaments of the pimpernel,—that tender little flower of the scarlet corolla, which, from its sensitiveness to light and atmospheric moisture, has obtained the rustic name of “shepherds’ weather-glass.” Here too the beads vary in colour with the changing tint of the petals, though ordinarily very pale. Similar again are the rosaries

upon the stamens of the Pinguicula, a plant of totally different botanical family; the beads, as in the pimpernel, diminishing in size towards the extremity of the chain, or exactly after the manner of the threaded pearls which gleam upon the bosom of a peeress. The stamens of the Lancashire-asphodel, a plant of the morasses of central and western Europe, half lily, half rush; and those of the Bulbine (a flower indigenous to the Cape of Good Hope, and first-cousin to the hyacinth) agree in having the filaments covered with a kind of plumage, not beaded, as in the plants described, but composed of long tubes. Very similar again to this is the quasi-plumage of the Celsias and the Verbascums, plants not only quite distinct from the preceding, but so far removed as to be in company with the foxglove. So lost in their investiture are the filaments of these various flowers, that the gem-like anthers alone remain visible. In the filaments of the Deutzias, flowering-shrubs from Japan and northern China, with milk-white bloom, there is curious echo again; both these and the liliaceous genus *Allium* having on their stamens a pair of angular shoulders.

74. The anthers supply objects not excelled in beauty even by the total of the flower, the form, the colour, the disposition, being all of the utmost elegance and diversity. Sometimes they are spherical; sometimes oval; in certain flowers they have

the figure of an arrow-head. When of the last-named shape, it happens not infrequently that they are so disposed as to form a cone, illustrated in the black pyramid of the borage, the purple one of the *Tetralthea*, the yellow one of the nightshades and the *Ardisias*, and again in the golden stiletto of the Virginian-cowslip, aptly denominated in its native country the "shooting-star." Excepting the two last, which are partners up to a particular point, these plants again belong to families in no degree related.

75. One of the most attractive peculiarities of the anthers is illustrated in the position called "versatile," which associates, as to this character, the lily, the honeysuckle, the passion-flower, and all kinds of grasses. Instead of standing bead-like upon the apex of the filament; instead of terminating it after the manner of the head of a spear; the anther, in the plants mentioned, is so poised as to balance horizontally. After casting the pollen, the extremities curve inward, and every anther becomes a golden lunette. The attenuated extremity of the supporting filament is by this time rendered evident, and how it sustained so weighty a body as the anther was originally, or while freighted with its store of pollen, cannot but excite surprise and admiration. Plantains also have versatile anthers, and in this respect again mimic the grasses they love to consociate with. A trifle perhaps to put

upon record, except as illustrating by what simple incidents the mind may be captured, and impetus be given to it for life,—to me, it is still a fact of most pleasant recollection, that in the balanced beauty of the swinging anthers of the woodbine lay one of the earliest incitements I received to the study of flower-structure. It is sweet to let the soul recall the first impressions it received of the sublime, the majestic, the inexhaustible;—of love and of hope, and of reciprocity of kindly affections,—*hæc meminisse juvabit*;—no less happy is the quiet thought, after many years, of the golden inspirations which flowed into us in early youth from the honeyed lips of nature, opening springs limpid and refreshing as Hippocrene; and which, though in after and busier years often lost to immediate consciousness, still, like that other sacred stream which once was Arethusa, endure for ever; and often, when least expected, and most needed, burst out again, clear and bright as in the beginning. Every true naturalist enjoys a renewed puberty of the soul. While other people are young but once, he, like the cicada, in age recovers his spring-time. In this respect he is abreast of the man of genius, whose privilege, like that of the sunshine, is to weave as lovely a sky for the evening as for the morning.

76. In order to discharge the pollen, and thereby fertilize the pistils, the anthers must needs open. The opening takes place in very various ways.

Usually it is longitudinal, each of the two compartments splitting from top to bottom. In the heaths and *Pyrolas* a circular pore makes its appearance at the extremity of each of the cells, and we seem to have a model of a little double-barrel gun; occasionally the discharge is effected by the lifting up, on each side, of a kind of hanging shutter, as when a ship opens a port-hole. This last occurs in the berbery, the *Epimedium*, the bay-tree, and a few other plants, which, except in this one respect, are destitute of resemblance.

77. Mark, too, what curious agreement exists in the stamens of certain plants with regard to their manners and customs! In order that the pollen shall be safely conveyed over to the stigma, and at the proper time, there are innumerable ingenious contrivances. Insects, as Mr. Darwin has shown, immensely facilitate the process, and in some cases seem absolutely indispensable to its accomplishment. A different electrical condition of the stigma and of the particles of pollen discharged and floating in the air—something probably, also, of the nature of attraction (with the operation of the magnet for its antetype in inorganic nature)—may be assisting in the good work, invisibly, yet energetically. Over and above these uncertain and speculative aids, plain and beautiful to every curious eye is that wonderful leaping up of the stamens which constitutes one of the prime charms in the life-

history of the Kalmias, and, strange to say, in that likewise of the despised stinging-nettle! The Kalmias are North American flowering-shrubs, with clusters of pink or white corollas the size of the bowl of the acorn, every corolla containing ten stamens, the filaments of which, so long as the flower is in its aurora, gracefully arch outward and downward, the anthers being held fast in little niches. Soon, however, as ripe, every anther starts from its cradle, one rising after the other, and so great is the force of the forward leap that the pollen is jerked out like the missiles from an ancient catapult.

78. In the nettle the movement is a little different. Here, as well as in its near allies, the pellitory and the "artillery-plant," *Pilea muscosa*, the filaments are similarly held down, while the tissue of which they are formed is so remarkably elastic and expansive, that, when touched, they change instantaneously from the curved to the perfectly straight condition, and the pollen is ejected in a shower. In these last-named plants the discharge is outward, not inward, as in the Kalmia. Why so? Because the Kalmia is a bisexual plant, every flower containing its own female organism in the centre, complete and perfect, as well as a company of stamens; while in the nettles, on the other hand, the sexes are separated, and the pollen, to be useful, must be scattered centrifugally. Similar movements may be observed in the stamens of the

berbery, the sunflower-cistus, and many other plants; and analogous ones in the stamens and pistils of the *Nigella*, and in the stigma of the *Mimulus*. Nothing more of course are these phenomena than simply organic; still are they consummately beautiful as prefigurations of the love of man and woman, because of which they do, in truth, exist. All things human, therefore all things Divine, are adumbrated on the platforms of vegetation.

79. What courtesies again in flower-life! what order and graceful ceremony! In the little plateaux among the sand-hills by the sea, where water lodges in winter, I find the *Parnassia*, a flower resembling a buttercup in size and shape, but white as Parian marble, and delicately veined. In the centre stands a conical and purplish ovary, around which, while young, kneel five sulphur-coloured anthers. Presently one of the anthers enlarges considerably; the filament elongates to such an extent as to enable it to incline over the ovary, which it kisses and then retires; meanwhile the anther of the next alternate stamen is swelling and becoming lifted so as to enable it to fulfil the same design; then rises the stamen next alternate to the preceding one, and finally, the two last rise nearly together, so that not one of the five is left absolutely to the last. Eventually all five (usually casting off their emptied anthers) lie back horizontally among the petals, forming a five-rayed star; in due time the ovary

becomes a capsule of innumerable seeds resembling the finest possible sawdust, and next year the ground is whitened anew with the floral snow. Similar *seriatim* movements take place in many decandrous flowers, such as the wood-sorrel and the cranesbills, five of the stamens rising first, and five afterward; while in polyandrous flowers such as the mallow, the opening of the anthers is step by step, beginning from the base, and reminds us of the successive expansion of the flowers in a long raceme. Potentillas exhibit this in a very pretty manner. In the *fruticosa*, the *rupestris*, and probably in most or all of the others, the twenty-five stamens form a pentagon of semicircles or festoons; the curves directed towards the middle of the flower, and every set of five having the central stamen longest, and the stamens right and left of it gradually shorter. The opening begins simultaneously at each extremity of every festoon, so that at last there are only five stamens left unexpanded, or one in the centre of every company, which left one then forms a kind of golden keystone to the arch, modestly waiting its turn, and fulfilling its purpose when the time arrives.

80. The particular *shape* of the pollen-grains supplies also some very beautiful examples of repetition. Take for instance the similarity between those of the convolvulus and the mallow, which are alike spherical and covered with minute spines.

81. The echoes in the pistils or female element of the flower let those describe who can faithfully depict what woman is in the scheme of God's creation. For the shapes of beauty here displayed, the language of Botany has yet no names; plastic art has yet to glean from them its most perfect and exquisite designs. So simple, in many plants, as to resolve into little more than a globe and a pillar, unornamented, and scarcely tinted; the pistils of others can be spoken of only by comparison with the plume, the coronet, the Ionic capital, the chalice, the fleur-de-lis, the pendant from the ear of an empress; while in sparkle, in sweet brightness of golden or emerald velvet, in romance of sculpture, and in dyes, they eclipse all fable. The history of these wonderful organs would fill a volume. Suffice it at present to commend to the intelligent observer the pistils of the class of flowers called "composite;" those likewise of the sorrels and docks, of the Begonias and the geraniums; of the crocus, the poppy, the periwinkle, the pæony, and the cactus. To note the echoes found in the pistils of flowers would alone agreeably fill the leisure of a long summer. Ah, how worthily expended upon these sweet utterances of the Divine wisdom would be many an afternoon that is now cast away in ignoble temporicide!

82. The pistil of a flower, when efficiently fertilized by the stamens, in due time becomes the

fruit of the plant. Everything curious that has occurred previously of the nature of echo is here recapitulated, so that fruits alone would be sufficient to establish the proposition laid down at the outset. Sometimes a large portion of the flower itself becomes metamorphosed, and is then so amalgamated with the ovarian part of the structure as for its original nature to be utterly concealed. The flowers, in a word, *become* the fruits. This happens in the mulberry, the fig, and partially in the Gaultheria; also in the cones of pine and fir-trees, the cedar, the cypress, and the hop. The rule, however, is that the ovary alone shall become the fruit, or that a portion only of the perianth shall be incorporated with it. The last-named condition is found in the fruit of the marvel-of-Peru, also in apples and pears, in quinces, and in roses; the shell of the marvel-of-Peru, and the succulent portion of the apple, etc., being no other than transformed calyx. Form, of course, supplies innumerable examples of likeness, as presignified in the agreements in the shapes of Leaves, the carpels of fruits being no other than presentations, in new apparel, of the self-same organic base as that which underlies the green leaf. What beautiful conformity in the follicles of the pæony and the Sterculia; in the capsules of the primrose and the Lychnis! Resemblances of another kind are found in the triple fruits of the sparges, the Tropæolum, and

the Cneorum; in the bur-like heads of the plane-tree and the Sparganium; and in the boxes, with movable lids, called "pyxidia," which are found in the pimpernel, the henbane, the plantains, and the Lecythis;—plants, in every instance, so distinct from one another, and belonging to countries so far apart, that except for the solitary likeness adverted to, they might be cited as illustrations of the incommensurable. Strange resemblances arrest us again in connection with the wing-like appendages to certain fruits. Sometimes these latter are surmounted with coronets of down, as in composites and valerians; some plants have them provided with thin green wings, as in the sycamores and maples, the elm, the Ptelea, and the ash-tree; others are supplied with silky and wavy tails, as the pasque-flower, the Dryas, and the clematis. Certain seeds, in turn, assume the forms of these identical fruits, as beautifully illustrated in those of asclepiads, willows, willow-herbs, Bignonias, and the cotton-plant; and at the same time, for their own part, give curious echo also of one another, in shape, colour, and ornamentation. Compare, for instance, the lace-like tunics of the seeds of orchids and of the Pyrola; and the enamelled and embroidered surface of those of very many of the Caryophyllaceæ, the poppy, and the henbane. In respect of flinty hardness and brilliant polish, compare again the seeds of the rosary-pea, the violet, the grom-well, the Mucuna, and the Menyanthes.

CHAPTER VI.

COLOURS AND ODOURS.

83. COLOURS and odours, like forms and outlines, supply many beautiful examples of echo. Those connected with colour are less numerous, perhaps, than any other kind ; colours, with a few exceptions, being distributed with near equality, and being reducible to a small fixed number of primaries. There are plenty, nevertheless, for the establishment of the fact, and what may be deemed wanting among these is amply compensated in the profusion of the resemblances among odours. The latter, as a rule, are curiously localized, and though probably reducible, like colours, to a small fixed number of primaries, at present this part of their history is unknown, and we are fain to deal with them as productions *sui generis*. That they should be composite, rather than simple, is to be expected both on physiological grounds and analogical. What chemistry, sixty years ago, did for the earths and alkalies, showing potash, and lime, and soda, and magnesia, to be oxides of metals ; what the same illustrious science has done for air and water, showing even these seemingly most simple and primitive things to be compounds, and resolving them into

their elements; what etymology, in the nineteenth century, has done for words, proving the descent from a few prolific roots, of thousands that are apparently independent and underived—showing, too, a still more copious lateral increase through the operation of what in Heraldry is called “counter-change,”—just this no doubt remains to be done for vegetable odours, and as surely as roses fill the air of June with scent, will the achievement ere long reward some earnest interrogator. It is pleasant to think how much we know in these modern days: there is equal refreshment in thinking how much there is yet to discover. Wonderful as is the mass of scientific knowledge already acquired by man, how vast is the amount waiting to be garnered! It is one of the excellent qualities of Truth, that, like the sun, it shines anew every morning, and that no man can come up with it and girdle it. To the reverent mind the immensity of the unknown stands as one of the great certificates of the Divine Benevolence, which delights to hold in reserve for every succeeding age some new perception, some new disclosure of nature’s order and economy, granting to no man, however zealous and energetic, to see more than “in part,” and ever opening new vistas to love and intelligence. We have no need to deplore our ignorance; we should rejoice rather in the plenitude of our possessions; not regarding enviously the privileges of the centuries that are to

come, but gratefully acknowledging our own inheritances. People talk of the "good old times." Surely that is quite reversing the fact. For that portion of time which is gone by was the *youth* of the world: these present ones are the "old" times; let it be ours to make them good ones, each man for his neighbour first.

84. Red, blue, and yellow, the primary colours, and their countless shades, including white, which in flowers is only the extremely diluted condition of one or other of them, occur side by side in almost every large botanical family,—in every large family, that is to say, which produces flowers popularly so called. Grasses, conifers, mosses, and other such races of plants, not being provided with petaline flowers, of course give but little scope for nature's sweet pencil. *Their* beauty is of another order altogether; for in nothing does nature take more delight than in diversifying the ornaments she places upon her offspring. Singular exceptions do certainly occur. Blue is unknown among the 500 Rosaceæ, and among the 1300 plants which have their type in the classic myrtle; red is unknown among the 500 campanulate flowers; and yellow is scarcely found in either of the wealthy races presided over by the geranium and the carnation. Diffused, however, they are, and in very fair proportion, these blues, and reds, and yellows, light and dark; whence, as said at the outset, echoes

must needs be scarce among them. Like hope, and faith, and love, red, blue, and yellow are everywhere; and for echoes we must look to specialities of tint such as compare with unaccustomed human virtues. How beautiful, for instance, those found in connection with green! Cropping out where least expected, and where no sort of structural affinity demands or suggests them, they vindicate the unity of the Divine handiwork as thoroughly as do any resemblances of shape and profile; yea, far more so, since Colour has always more significance in it than simple outline; and whatever has most significance in it for the heart and mind of man must needs be nearer to God, and speak more distinctly of His purposes. The value of things consists not so much in what they *are*, as in what they signify and announce to our inner senses: that which has nothing to say for itself is always described by the instinctive denomination of *insignificant*. Cropping out, I say, where least expected, this lively and elegant tint, so common in leaves, so rare in flowers, green, the emblem of rejuvenescence, of youth ever revolving upon itself, thus of the beautiful and ever-freshly-springing abundance of a serene imagination—is the sole colour of one of the Cape heaths, thence called *Erica viridiflora*; also of the blossoms of a species of tobacco, the *Nicotiana rustica* of North America; also of various delicate and lovely flowers of the

orchideous tribes, such as the tway-blades of England, *Listera ovata* and *L. cordata*.

85. These exhibit the green hue in the *petals*. Innumerable examples might be cited of *imitative* green flowers, the hellebores, to wit, *Helleborus viridis* and *foetidus*, which in their great green calyces seem at the first glance to be peers of the *Erica*. These, however, we do not reckon, in order that the idea of truly green *flowers*, in the strictest sense of the word, may be distinctly and absolutely preserved and justified. Very pretty is it, at the same time, to note that the genuine petals of the plants in question, these identical hellebores, are likewise green, and usually of a more vivid green than the sepals which overshadow them. For they are so minute as quite to elude popular seeing, and serve the purpose simply of honeycups. In one species, the familiar Christmas-rose, *Helleborus niger*, the calyx at the time of expansion is pure white, matching the snow that usually surrounds it, the circlet of little green nectaries showing against the purity like a ring of emeralds. By slow degrees only does it acquire the full colour it is capable of, which is pinky green, and not perfected, as a rule, till the seed is nearly ripe. The long retention and the heightening colour furnish collateral proof, if any were wanting, that these grand white pieces are only sepals, and not petals, since the petals of flowers invariably wither as soon as the stamens

have fulfilled their purpose ; whereas for the calyx to remain, and become a fence for the ripening fruit, is one of the commonest illustrations of the wise economy of nature. Strange is it at the first view, that a flower of immaculate whiteness should be called *niger*. The explanation lies in the colour of the root, which well deserves the epithet, and has a parallel in the botanical name of the snowy-flowered elder, *Sambucus nigra*, where the allusion is to the colour of the ripened berries. I am inclined to believe that the Christmas-rose is the famous "moly" of the ancients,

That Hermes once to wise Ulysses gave,

if we may trust, that is, to Ovid,—

Pacifer huic dederat florem Cyllenius album,
Moly vocant superi ; nigra radice tenetur.

(To him had the peaceful Cyllenian God given a white flower, which the heavenly inhabitants call moly, and which is bound to the earth by a black root.—Met. xiv. 271.)

86. Nature renews herself so accurately year by year, that no doubt the woods and meads that belong to classic story, Enna and Arcadia, the banks of the Clitumnus, the fountains of old Boeotia, the streams beloved of the nymphs, to this day present the self-same flowers that were a delight three thousand years ago. In the aggregate we see them as they were seen by Pindar and Sophocles ; still it is pleasant when there is a clue given to the poets'

special favourites; to know that *our* myrtle was theirs likewise; to be able to identify their crocus and acanthus. The classical associations of plants and flowers constitute, to the accomplished mind, no inconsiderable measure of their charm. I do not envy the man who can look upon that rubied dittany we spoke of once, and not think of the beautiful fable of Venus and Æneas; or to whom the hyacinth has not a higher fascination for that when Minerva dressed and decorated Ulysses, "She sent down from his head curled hair like unto a hyacinthine flower."* The allusion is to that most rich and sumptuous violet-purple variety which, in the spiral plenitude of its many-petalled blossoms, gives, when in perfection, the idea of massive ringlets. The richest and finest shades of black always possess a purple tinge, as in the plumage of sable birds; and just this, the poet implies in his matchless epithet, was the hue of those clustering locks. Ah, how Penelope must have admired them!

87. The sprinkling of the petals of flowers with delicate drops of other colours, and that resemble inlay of jewels, as happens in the saxifrages, and their being laced with coloured veins, as happens in the henbane and the pencilled geranium, seem

* Odyssey, xxiii. 158. Milton, it will be remembered, imitating the Homeric image, gives "hyacinthine locks" to Adam in Paradise.

also to belong to the general plan and decree of nature, examples of both kinds of ornament occurring frequently. They exist, nevertheless, under conditions so widely unlike that it would be legitimate, perhaps, to class them with the true echoes. How exquisite the purple spot at the base of the gum-cistus petal ! How lovely the similar mark in the lilac *Oenothera* ! The same is found again in many of the poppies, and in various flowers allied to the iris and the fleur-de-lis. Compare again the colouring of the horse-chestnut flower with that of many tropical orchids, certain *Dendrobiums* for example ; and that of the *Limnanthes* of California with the water snow-cups, *Ranunculus aquatilis*, of western Europe, in both of which pearl and gold are equally proportioned. Here, too, it may be well to mention the wonderful capacity for *change* of colour in the flowers of certain plants. The dahlia gives almost every imaginable shade that is referable to red and yellow ; the tulip, the calceolaria, the pansy, are the floral kaleidoscopes of their respective families ; the sweet-william and the pelargonium are alike insatiable in the same direction. See again how curiously certain flowers, belonging to races in no degree allied, love to run through a long series of tints in their own individualities, as if they sought to emulate the trees in their movement from the green of spring to the scarlet of autumn. The

Hibiscus mutabilis commences life nearly white, and eventually becomes crimson; the changeable stock commences with yellow and ends with purple; Francisceas show every shade of lilac simultaneously after the plant has been in bloom for some few days.

88. Now as to odours and perfumes : in the lemon verbena of Chili, we have the exact scent of the Indian fruit after which it is named ; peppermint, a native of Europe, is quite as closely repeated in smell by the *Pelargonium piperitum* of the Cape of Good Hope ; the smell of garlic is renewed in the cruciferous plants called *Alliaria* and *Peltaria*, and again in the *Petiveria*, which is indigenous only to the island of Jamaica. After these we have the woodruff and the sweet melilot, which, when dried, yield precisely the same odour as new-made hay, the chief source of which is the grass called the "sweet-scented vernal." All three plants agree in the very curious property of being scentless while living and growing, or rather in not exhaling any of their fragrance while living and growing, the odour being poured forth only when they are cut or broken, or torn out of the ground and thrown prostrate. They remind us of the balsam-trees of Arabia, which, until wounded, none would suppose to be charged with such golden sap ; wherefore, too, are the woodruff, the melilot, the balsam-trees alike images and emblems of the

human heart, the dearest charities of which are scarcely possible to be expressed until itself has been touched by trouble. Few of us truly know what wealth of sympathy the heart can hold, and what stores are ready for ourselves, even in the most passive to appearance, any more than we can see what rills of odorous juice are running through the branches of those little wild-flowers. It is a somewhat mournful truth, but not without its consolations, that everywhere in the world fracture seems needful to bring to our consciousness the best and loveliest. Few men, if any, are able to judge of their own happiness till it has been in some measure overturned; for happiness is like light, something which embosoms us so perfectly that we know not its composition till the rays are broken. Then appear its lovely colours, yet not necessarily scattered, for the wise and thoughtful, whatever may happen, always behold them as a rainbow. The reader of Virgil will here have floating through his mind that beautiful passage in the *Æneid*, where the gentle but unfortunate Dido speaks for the genuineness of her sympathy on the score of her own experience of misfortune:—

*Me quoque per multos similis fortuna labores
Jactatam, hoc demum voluit consistere terrâ.
Non ignara mali, miseris succurrere disco!*

89. Another curious cluster of resemblances in matter of odour, is found in the plants which exhale

the smell of *musk*. This is afforded by the foliage of the well-known musk-plant, *Mimulus moschatus*; by that also of the Australian musk-tree, *Eurybia argophylla*; and of the little European seaside wild-flower called *Erodium moschatum*. A similar scent is evolved from the flowers of the European musk-mallow, and by those of several orchids. Two singular facts here claim consideration at once: First, that the mallow gives forth its musky scent only toward twilight and subsequently; secondly, that the orchids, to which we have so many times adverted, yield, in their different species, counterparts of almost every perfume known to botanists! Because of its curious reticence, Linnæus classed the musk-mallow with his "Flores tristes," or "melancholy flowers," the elegant image intended in the name being that, along with such as do not expand their blossoms until sunset (the evening-primrose for example), the plant was gifted with conscious life, and was ailing in heart; that the light of day was a burden, and that the shades of evening were alone congenial. Thus that the "flores tristes" were the nightingales of the floral world, the stars that do not come forth till the sun has set. Apart from the Linnæan poetry, which, flowing from so great a soul, claims at least our affectionate respect, the life-history of these *flores tristes* is one of the most engaging problems of physiology. No one has yet explained why they

are indifferent to the warmth and brightness of the sun, which to most things is the charioteer of life and vigorous action; no one knows why the cereus delays till all is dark—why the convolvulus does not open till near daybreak. Can it be another way in which the Divine omnipotence chooses to declare and express itself—intimating independence of its own apparent laws—showing ability, equally facile, to bestow flowers by night and by day, in sunlight and in darkness? Though we take the wings of the morning and dwell in the uttermost parts of the earth; though we make our bed in Hades, *He is there*. Shall He not reveal the same truth in the evening-scented flower, in the blossom that expands only in the silence of deep night? While the physiologists are striving to discover the scientific reasons *why*—while we aid them in collecting facts and recording observations, and look forward to the day when they shall be cheered as successful students—let us rejoice in the great conviction, that as the hand is never shortened so that it shall not save, so neither is there ever a time or period when the Divine life does not flow forth and dapple the world with the sweet gladness and inexhaustible language of beauty.

90. How charming was that ancient perception, which long before the singing of the Tale of Troy, gave to flowers the name of the "breathers!" for no other is the signification of the Greek word *anthos*;

and "flower," through the Latin *flos*, has precisely the same meaning. It would seem as if in this matter of odour was conceived to lie their inmost nature and essence. Some author has spoken of the yielding of fragrance as the "prime duty" of flowers ; certainly a flower, however lovely in configuration and colouring, always seems unfinished if destitute of smell. The odours, moreover, are no casual or uncertain qualities. Every different kind of flower preserves its own, though, as we have just seen, there are most interesting agreements between those pertaining to different families and different countries. Sometimes the odour changes with change of the hue of the flower, since here too is a most intimate relationship. White varieties of flowers that are usually coloured, often smell sweeter than the showy varieties, as if nature, so abounding in compensations, sought to place the two conditions on a par—the one excelling in attire, the other in fragrance. So exact is the relation between colour and odour, that it is now established that *blue* and scent rarely go together ; that white flowers, on the other hand, as a rule, are fragrant ; and that orange-coloured, brownish, and lurid ones are generally disagreeable. It should not be overlooked that while most plant and flower scents are pleasant, there are many that are absolutely revolting. It is quite possible that to some the foxy odour of the herb-robert may be inoffensive ; but it is hard to

think that any one can relish the smell of the hounds-tongue, which resembles that of mice; or the odour of the henbane, or of the figwort, or of the nauseous *Fritillaria nigra*. These are the discords which, as everywhere else in nature, seem inevitable to the present order of things. The time may come when they shall disappear, and the world rejoice in unalloyed sweetness. Yet perhaps they may be needful, just as discords are in music; and truly there is more likeness between odour and colour and music than many of us, at the first suggestion of it, might be disposed to believe. Mr. Septimus Piesse, in his very entertaining volume, "The Art of Perfumery," has shown that there is a gamut of odours, just as there is a gamut of musical sounds; and further, that all bouquets composed with a view to pleasure of nostril as well as of eye, should be constructed according to the laws of musical harmony, the parallelism of which with those of odour impressions, he sets forth in minute detail, and explains upon philosophical principles.

91. The wonderful way in which the orchids recapitulate and summarize so much that pertains to other races of plants, and to particular individuals—illustrated in the frequent recurrence among them of the musky odour—is by no means the only fact of the kind in their history; almost every kind of fruit-scent is known among them—the apple,

the citron, the strawberry, being familiar; so are the aromatics, cloves, cinnamon, and vanilla, which last is the direct produce of a Mexican species. It is sufficient for our present purpose here to indicate the general fact; and when we have done with their echoes we may contemplate their marvelous prefiguration of the forms of insects and birds, and the aerial habits of the greater portion, few having their roots in the earth. The epiphytic character has been spoken of above. In this respect, and now in the anticipation of the forms of winged creatures, after concentrating in their own realm so much of the most delicious part of flower-nature, they seem to hover on the very margin of the plant-world, and to be aspiring towards the organization and the flying freedom that ranks above them. "Give us wings!" is the universal cry of nature. The orchids stand in the van, and seem about to have their will.

CHAPTER VII.

MISCELLANEOUS. CONCLUSION.

92. ECHOES of a miscellaneous character, and not strictly disposable under any of the preceding heads, are found in abundance. It is time, however, to draw these chapters to a close, adverting merely to some few of the most curious. Many plants, for example, in no wise related as to structure, are prone to propagate themselves by the production of young ones independently of the accustomed sexual process. These are called "viviparous," as producing their offspring ready hatched, so to speak, and alive, in contradistinction to the "oviparous" mode, that is to say, by seeds, or vegetable eggs. Not that they are exclusively viviparous, but that the viviparous method is superadded to the other, and that more or less of a preference is usually given to it. Sometimes it is for the purpose, so it would seem, of greater security of perpetuation, the plant growing naturally in bleak and stormy places, where the stamens and pistil might be hindered from fulfilling their functions. Such, for instance, might be thought the case with certain little viviparous saxifrages and grasses of the highland mountains; also with the subalpine *Polygonum viviparum*, and the *Epilobium germascens*, which grows

upon the Caucasus, 2,400 feet above the sea level, haunting the margins of rivulets, just like the *Epilobium alpinum* of North Wales and the Scotch highlands, but differing from the latter in producing axillary bulblets. But no such danger is experienced by the toothwort of the English woods, nor by the Bryophyllum of the Mauritius, nor by various plants of the lily and onion kind, nor by the sundews of the European morasses, nor by many kinds of fern, some of them indigenous to the tropics. Their life is in no degree imperilled; seed is in most cases being produced simultaneously. For what purpose then does this curious power exist? Whatever the physiological reasons, the phenomena form a group perfectly independent and novel, and again beautifully declare the unity of the constructive and sustaining energy which underlies them. In all the cases mentioned, when the young plants have attained a sufficient measure of size and strength, they loosen their hold upon the parent, as an infant does of its mother's bosom when content; they drop to the ground, and there take root. Sometimes, owing to the weight of young plants, a fern-frond is made to arch over, and then seems a bed of seedlings; or if it be a grass that is viviparous, the entire cluster of young plants is lowered to the earth by the bending stem, the young plants taking root, without leaving go, and giving a kind of pretty little portraiture of the banyan-tree of India. So

exquisitely do the things of the cold north instruct us, in their miniature manners and customs, concerning the grandeurs and the travellers' tales of the equatorial zones. We need not go abroad to behold miracles; to open eyes there are always plenty at home. Such arching I have often witnessed in the grass called *Festuca vivipara*, when grown in gardens,—the same which in mountainous districts, as in the Island of Arran, near the mouth of the Clyde, often presents the spectacle of one little meadow sprouting upon the surface of another!

93. Such then is the nature of the echoes that pertain to plant and flower-life. It is not for nothing that such likenesses exist. They are laid open to our intelligence for an express and peculiar purpose. I count them among the gifts which it has pleased the Author of all good to bestow so lavishly for our pleasure and our solace. The speechless talk of these little things, the weed and the grass, often has more of emphasis for the reverent and listening ear than a whole homily of theological appeals. Certain it is that by reckoning them as a portion of the "small mercies" in which we are embosomed, after awhile we find them messengers. We should ever be on the alert for the *small* tokens of the Divine love. We cannot help seeing the great ones, and there is preaching enough about them. The

heart, like a needle, may be made magnetic: our wisdom is to have it so, so that it shall seize upon every atom and unconsidered trifle, finding metal where the indifferent and the incurious cry, All is barren. The little things, above all others, assure me that I am not living in a world left to itself, but in one that echoes, at every turn, the Besetting God.

THE END.

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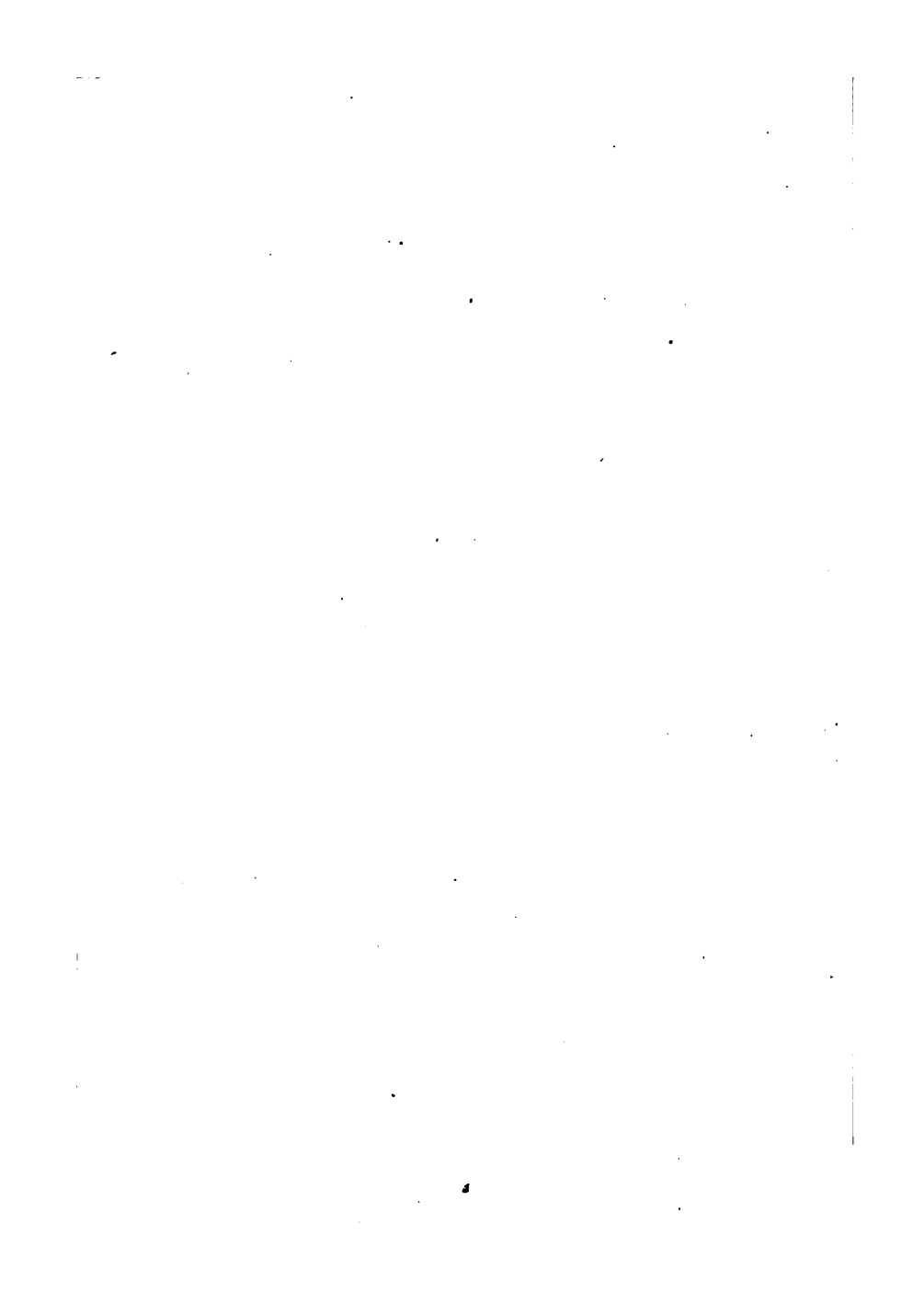
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